TECHNOLOGY

approach

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RADM William O. Burch, Jr. Commander

Head, Literature Dep't. CDR J. M. Wondergem
Editor, A. B. Young, Jr.
Managing Editor, LCDR D. M. Hume
Associate Editors
Flight Operations, LCDR R. A. Eldridge
J. T. LeBarron, JOC,
Maintenance, J. C. Kiriluk
Av. Med., Survival, Julia Bristow
Distribution, LT W. B. Kennedy
Art Director, Robert B. Trotter
Illustrator, T. W. Healy, ALC
Photographer, J. E. Williams, PHC
Prod. Asst., A. R. Navrro, JO2

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Letters

Poopy Suit Wear

Sir:

. . . Three thoughts regarding poopy suits:

1. Many of the young bucks want an *exact* temperature ruling as to when the P.S. must be worn. I offer to give them an *exact* temperature if they can give me an *exact* value on their life—down to the exact penny. It works.

2. A lot of people don't know about using talcum powder on the neck and wrists with a P.S. It's a big help.

3. When I have my fill of the cry babies moaning about the discomfort of the P.S. I show them enclosure (1), "Summary of the Comfort Factors of the Poopy Suit"—please read both sides carefully. (It is blank—Ed.)

Regarding the practice of using scarves or towels around the neck to make the collar less binding, any cloth up through the collar acts as a wick. It will take a little longer, but with patience these guys can kill themselves also.

FREDERICK J. BROWN, LCDR

Hot Spot Power

Sir:

The operations department of NAS, Alameda, has built its own power plant in the immediate area of the duty runway.

A 24-volt receptacle, furnishing commercial power has been installed at the alert watch position in the center of the field.

The power tap-off has been made from the runway lights power source, fed through a rectifier and stepped down from 220V to 24V. A break-away type jumper is led from the 24-volt receptacle to the external power receptacle of the alert crash truck.

In this manner it is not only possible to provide a two-way radio equipped crash vehicle in the immediate area of the duty runway but also to provide dependable service at a savings in overall operating costs.

In the past, extended use of truck mounted APUs has resulted in rather expensive maintenance costs and excessive out of service time due to breakdowns and/or overheats. The practice of keeping the alert vehicle's engine operating has proven to be economically unwarranted and conducive to spark plug fouling. By using the external power source two-way radio—communications are maintained and truck batteries are maintained in a fully-charged state.

By maintaining a "field alert" one vehicle is on-the-spot at all times and dead batteries are a thing of the past here.

SIO

NAS, Alameda

A 24-volt receptacle furnishes commercial power on a 'round-the-clock schedule to the radio-equipped crash vehicle in the immediate area of the duty runway.

Flashlight Wearing

Sir:

In the "Notes from your Flight Surgeon," October 1960 issue of APPROACH, a flight surgeon points out the importance of carrying a one-cell flashlight on night flights and states that his pilots wear it attached to the torso harness. I once lost a pilot because he did just that.

On a horizonless night, he apparently flew into the water on the upwind, overwater leg of an FCLP pattern. Despite an intensive search begun immediately, the body, in a fully inflated mae west, was not found until daylight. The pilot had died of exposure, there was not a scratch on him. A check with other pilots on the flight recalled the fact that this pilot was wearing his light pinned to his parachute harness, and he apparently abandoned the harness when leaving the sinking plane.

Moral: Attach the light to something that is not likely to be discarded; better yet, carry two.

ANYMOUSE

● **The "Note From Your Flight Surgeon" referred to in the above letter applied to the torso harness, not the standard parachute harness. A Mk-3C life vest is worn with the torso harness; this life vest has no place for a flashlight. On the Mk-2 life vest, worn with the standard parachute harness, the flashlight is standard equipment. It is recommended that the standard parachute harness be discarded on water entry to prevent entanglement in the parachute. A pilot wearing a torso harness releases his shoulder fittings to release his parachute canopy on water entry; the torso harness is, of course, retained. If you fasten a flashlight on a standard parachute harness, it will be lost when you release the harness. If you fasten it on the torso harness it will be retained.**

Continued

Pot Calling Kettle

Sir:

While giving a student a local area transition checkout we experienced a utility hydraulic system failure. As this is a relatively minor emergency we were burning fuel to have a more favorable landing gross weight. The date was 12 Sept 1960 and the time 1820 PDT.

We heard a Navy plane call Needles Radio on 243.0 (Guard Channel). Apparently Navy received no answer because he continued to call about every 30 seconds. Thinking he might need assistance I switched to Guard and asked if he had an emergency. He replied, "Negative." He then proceeded to give a VFR position report.

After one or two more transmissions he was quiet until about 10 minutes later when he started again. This was at 1850 and he was trying to call Palmdale Radio still on 243.0.

Although his abuse of Guard did not hinder the successful termination of my emergency, it could have easily blocked out several Mayday calls. He had the channel pretty well tied up for 30 minutes.

I feel this was a serious violation and constitutes a hazard to flight.

CAPTAIN MOUSE, USAF

● Navy pilots can't very well continue to walk around with their noses in the air making snide remarks about "Air Force tactical" (*They* in turn call it Navy common!) if they don't refrain from violating the sanctity of Guard Channel themselves. On the other hand, you might wonder whether anyone on the ground or in the air bothered to alert this Navy offender to the fact that he was cluttering up Guard.

Best Seller

Sir:

Air Facts just forwarded a couple of reprints of the article of mine which did so surprisingly well in being reprinted . . . "Grow Old With Me," APPROACH August 1959.

I thought you might be interested to know that a Navy pilot did it—I was in the active reserves until I came here three years ago. Had taught instrument flying most of WW II, ending up in night fighters.

I was at Norfolk for two weeks on a CO visit deal, as a guest of an AD squadron, in 1956.

I don't have one third of the periodicals which picked up the article, and therefore would be very grateful if you'd send me any copies you can spare, or the addresses where I can obtain one.

Many thanks.

ROBERT W. DUNCAN

Southern Illinois University
Alton, Illinois

● The Cdr's article was used in SAC's "Combat Crew," USAF "PACF Flyer," RCAF "Flight Comment" that we know of!

Tail-Piece New-Look

Sir:

We are showing off something new in the way of tail markings for P2V *Neptune* patrol bombers. Seeking better unit identification for ramp and contact area, the squadron sought and was granted permission to paint unit numbers on the vertical stabilizer. This has also helped to note which aircraft are landing, taking off, and, even, heaven forbid, violating restricted areas. The numbers are the same size as the squadron identification letters and placed midway between the letters and the bureau number.

VP-22

NAS, Barber's Point, Hawaii

Hi-Viz Seats

Sir:

I have noted through conversations with accident investigators that ejection seat recovery from jets (after bailout) is often an exasperating and difficult problem. In some cases seats are recovered long after an accident report has been closed.

To assist in recovery of ejection seats, I suggest that they be painted high visibility flame orange or alternate orange and black to assist in detection from the air. It might also assist in recovery of seats from aircraft lost in coastal water areas.

J. F. CONDREN, LCDR
Safety Officer

USS ANTIETAM (CVS-36)

● BuWeps directed Air Crew Equipment Laboratory to determine high visibility areas on ejection seats to aid in recovery following ejection. Project TED NAM AE 52124 was established in Aug. 1957. Upon completion of this evaluation it is expected a BACSEB will be promulgated. In the meantime some units have cross-checked or striped the backs and bottoms of aircraft seats. Preliminary reports indicate the areas must be carefully determined in order to prevent the fluorescent paint from being physiologically objectionable to flight crews and maintenance personnel.

It's Nemoff

Sir:

For your information, I am taking the necessary legal action against LCDR A. J. Newhoff for misrepresentation and violation of copyright laws in bylining "The Pilot and Pitching Deck" article in the November issue of APPROACH.

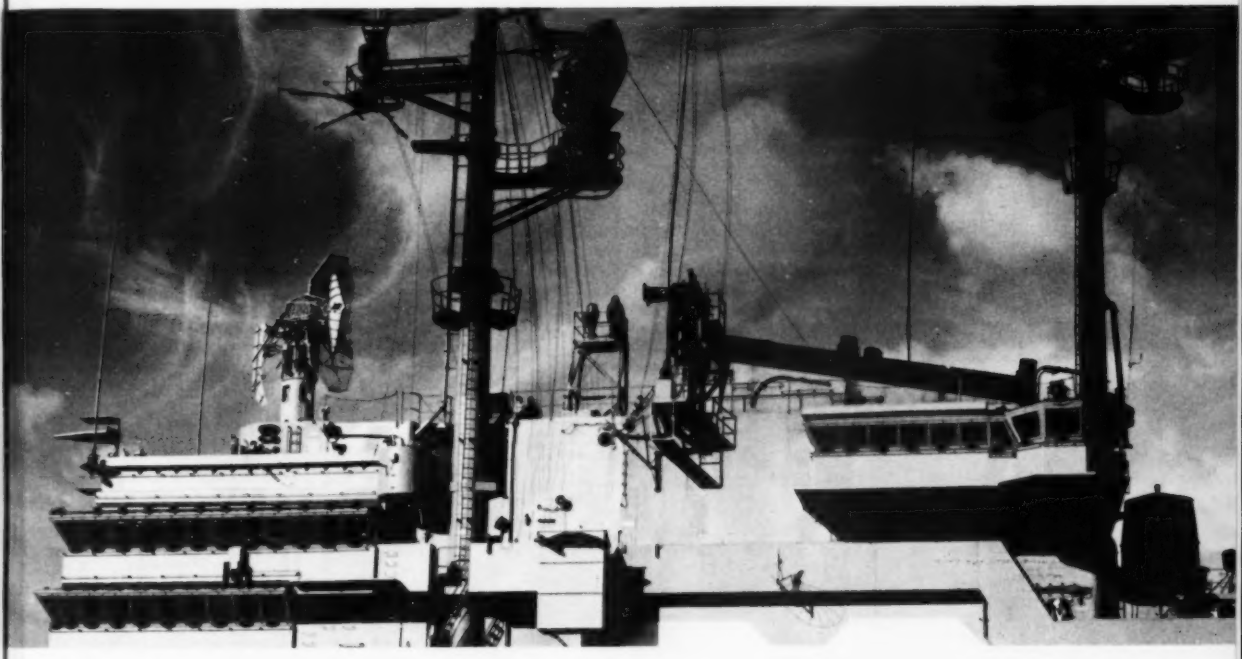
A. J. NEMOFF, LCDR USN

CVG-3 Senior LSO

**● OOPS!—I goofed!—For the record it's A. J. Nemoff, A. J. Nemoff, A. J. Nemoff,

BINGO FUEL

by LT. G.L. EDWARDS, RCN



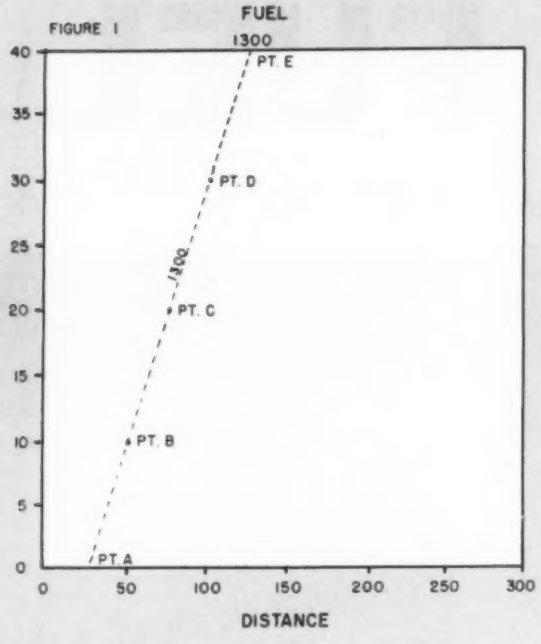
If the ship does not make an immediate decision when Bingo fuel is reached, the pilot must take the initiative.

EVERY carrier based squadron has some type of fuel divert information for use when there are fields near enough for landing of aircraft in cases of emergency. As everyone undoubtedly knows, this information tells the pilot how much fuel is required to go a certain distance, with a suitable reserve for landing, and is referred to as "Bingo" fuel. The figures are presented in tables in most cases and printed on cards for easy reference by the pilot.

However, many of these tables are ambiguous and none I have seen in the past are versatile enough to show the pilot exactly what he should do in every circumstance. Several aircraft have been lost recently because of improper fuel computation for diversion. For instance, if an aircraft is over the ship, there should be a different Bingo fuel for each and every altitude. Most charts and tables show Bingo fuel from the deck of the carrier and none I have seen show the pilot how to fly the aircraft for maximum range.

What I felt was needed in the cockpit was Bingo fuel information that would tell the pilot the following things:

For this altitude and distance from the divert field how much fuel is required, and



BINGO FUEL

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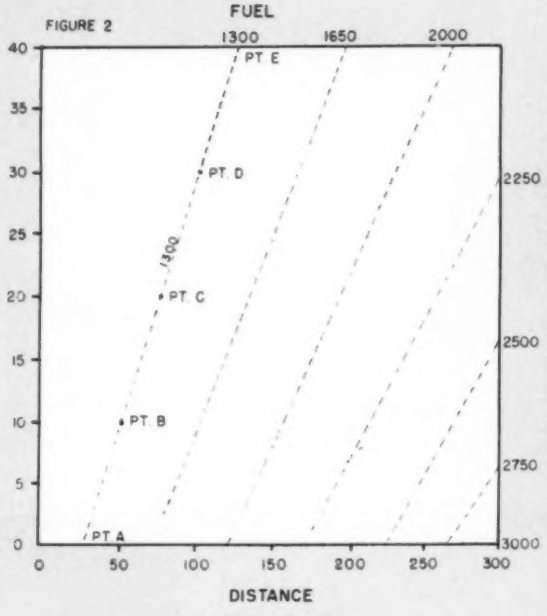


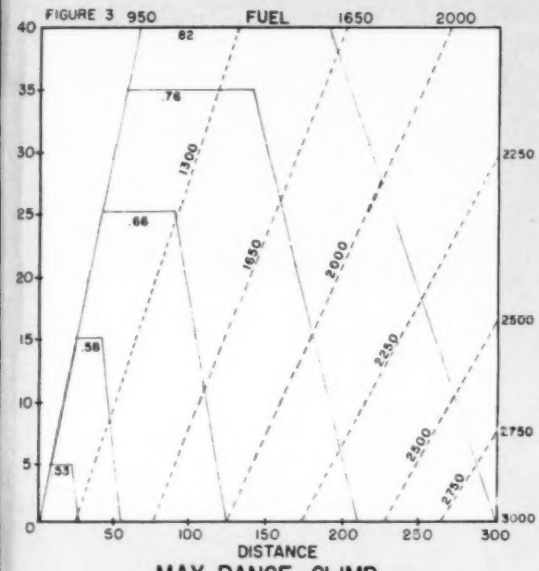
What is the best profile I should fly to get there?

At this point I would like to mention that all further figures used in this article allow 800 pounds of fuel in the break at the divert field. All figures are from the Emergency Range and Endurance window on the back of a REST computer except the distances for climbs and descents, which are taken from the climb and descent figures. The same information is available from any REST computer for any aircraft, and the method of extracting this information and putting it into graph form is explained subsequently.

First of all, I suspected that many pilots did not fully realize the value of climbing for increased range in turbo jet aircraft. I posed the following problem to several very experienced squadron pilots.

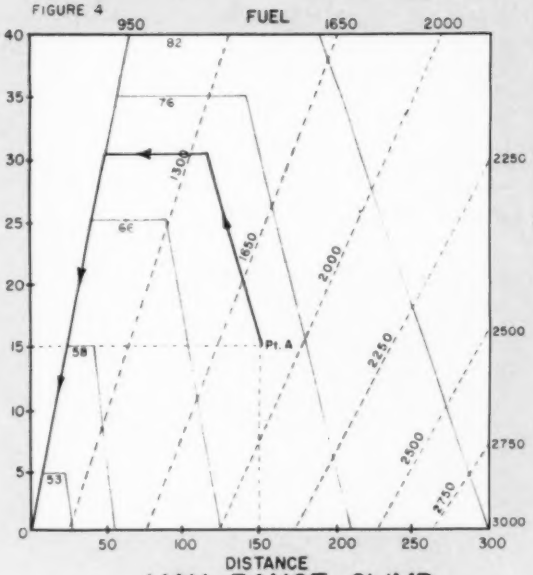
Allowing 800 pounds in the break, how much further do you think you can fly with 3000 pounds of fuel if you climb to optimum altitude of 40,000 feet than if you stay at sea level?

Answer this question yourself and then check it with the REST computer for your aircraft and you will be amazed at the answer. Most pilots queried stated they would not stay at sea level,



MAX RANGE-CLIMB

800 LBS AT BREAK
MRT CLIMB
IDLE DESCENT
NO WIND



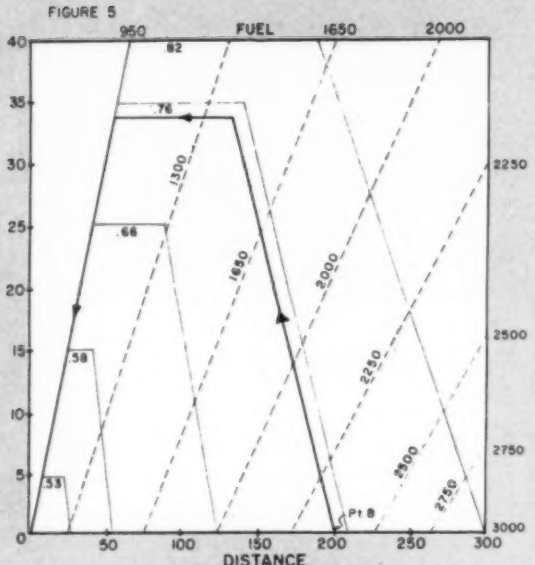
MAX RANGE-CLIMB

800 LBS AT BREAK
MRT CLIMB
IDLE DESCENT
NO WIND

but that they would climb, although most were not certain as to what was the best altitude. The answers I received were "insignificant," to "10% further," to "25% further." The answer for at least one aircraft is that you can go twice as far, or 100% further!

With the foregoing in mind I devised the card as shown in Figure 3. I found from the REST computer that for all cases I could go further by climbing to optimum altitude. The graph was constructed in the following manner (See Figure 1). Using the Emergency Range and Endurance window of the REST computer, I added 500 pounds to all fuels shown, thereby supplementing the 300 pounds allowed by the computer, and giving the 800 pounds required in squadron doctrine. Using the 0 altitude and 1300-pound window I found I could go 30 miles at optimum altitude, which was plotted as Point A. The 10,000-foot window for 1300 pounds gave me 65 miles at optimum altitude (Point B). The 20,000-foot window for 1300 pounds gave me 85 miles at optimum altitude (Point C). And the 30,000-foot and 40,000-foot window gave me 106 (Point D) and 130 (Point E) respectively. Now, by joining these lines I have a 1300-pound fuel line. Similarly, by plotting fuel lines for 2000 pounds, 2500 pounds, 3000 pounds,

FIGURE 5



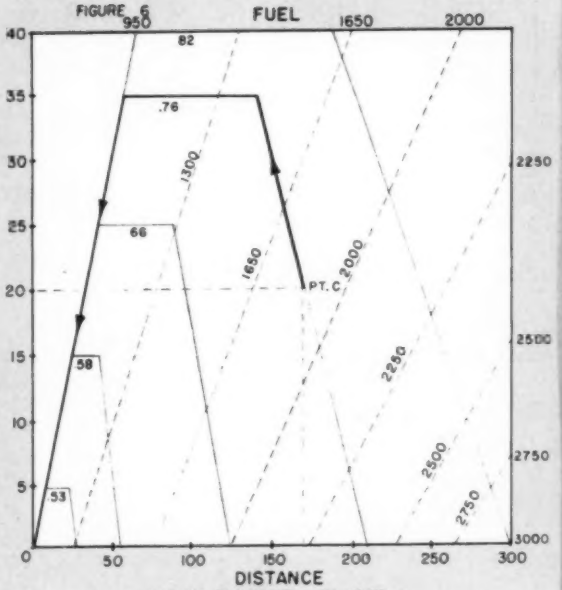
MAX RANGE-CLIMB

800 LBS AT BREAK
MRT CLIMB
IDLE DESCENT
NO WIND

BINGO FUEL

CONTINUED

FIGURE 6



MAX RANGE-CLIMB

800 LBS AT BREAK
MRT CLIMB
IDLE DESCENT
NO WIND

and so on, I have completed the fuel portion of the graph. (See Figure 2.) I now know how much fuel I require for any altitude and any distance, the only thing missing being the profile to tell me how to fly the aircraft to get there with this amount of fuel.

Using the same window I noted the optimum altitudes and using the outer portion of the computer plotted several profiles for climbs and I found that by drawing an idle descent line from 40,000 to sea level over the field, I had a descent profile good for all altitudes. The cruise portion of the profile is easily figured out. (See Figure 3.) The chart is now complete and ready for use. To become fully acquainted with the graph takes very little practice, but like all charts and graphs, it does take some. Here are several examples:

1. You are at 150 miles and at 15,000 feet. (Point A, Figure 4) What fuel is needed, and how do you fly the aircraft to get to the divert field?

Answer: By interpolation you see that fuel required is 1800 pounds. The profile indicates a climb to 30,000 feet, cruise at .70 Mach, and commence idle letdown 45 miles from the field.

2. You are at 200 miles and are given instructions to divert due to loss of your hook point. How much fuel is required and what is your profile?

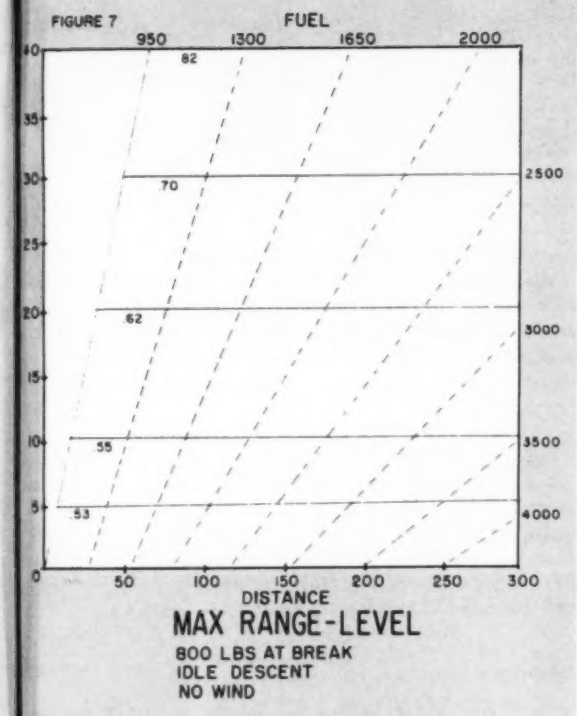


FIGURE 7

Answer: At 200 miles (Point B, Figure 5) you find fuel required is 2400 pounds. Climb to 34,000 feet, cruise at .75 Mach, and begin an idle descent at 55 miles.

3. What is bingo fuel at 170 miles at 20,000 feet? (Point C, Figure 6.)

Answer: By quick interpolation, 1825 pounds. Note that this is almost the same fuel required as at 150 miles and 15,000 feet. (See Problem 1 above.)

As soon as all pilots became familiar with this card they found it far better and far more versatile than any other type of bingo information they had been carrying in the past. It must be remembered that this card is only good if the pilot climbs as indicated by the profile, cruises, and makes an idle descent. It is also very important to take the wind into account as this card is made for a *NO WIND* condition. To supplement this Max-Range-Climb card, it was felt a diversion card that had information for level diversions at any altitude was needed for such emergencies as loss of instruments or navigational aids if there was bad weather present which the pilot did not feel like penetrating. This card was easy to construct by again using the Endurance portion of the REST computer but for plotting for range at the same altitude instead of for optimum altitude. Our squadron printed these cards back to back for ease of use, although some pilots carry one of each for convenience.

All pilots carry the cards on their kneeboards and are prepared to use them in the air, however, prior to each flight, we brief for three Bingos, as follows:

1. Bingo at sea level and staying there. (This would be in case of an emergency involving weather, instruments, or navaids, as noted above.)
2. Bingo at sea level at the ship, assuming a climb to optimum altitude is possible.
3. Bingo over the ship at 20,000. This would be the lowest bingo figure planned on; however, there would be a lower bingo fuel for all higher altitudes.

The Max-Range-Level graph is shown in Figure 7. ●

Lieutenant G. L. Edwards received his commission in the Royal Canadian Navy in 1953 and became an RCN aviator in 1954. He has served in an RCN *Banshee* squadron and as a jet instructor in T-33s. His exchange duty with the USN began in 1957 and included tours with three operational jet squadrons. Much of his time was logged during night and day operations aboard the USS INTREPID. Lieutenant Edwards returned to an RCN *Banshee* unit at Halifax in August of 1960.

'C' NOTES

Break Fuel Dumping Taboo

There have been instances where jet aircraft on carrier qualification flights have still been dumping fuel while entering the break. This fuel occasionally drops onto the plane guard helicopter and creates a rather dangerous situation. It is recommended that pilots be cautioned against dumping fuel in the vicinity of the plane guard helicopter.—*CNABATra*

LSO Technique

LSO technique calls for the use of the same "cut" angle on the beach during FCLP as is used on the ship. This would mean that during FCLP the plane would always be cut when it reached a certain position in relation to the LSO regardless of wind velocity. During FCLP, the LSO would always "look" the same to the pilot as he does on the ship. This technique counters the tendency of the pilot to push over when he comes in on the ship because the LSO appears considerably closer.—*USS* LAKE CHAMPLAIN

Too Many People on the Flight Deck, When an Emergency Occurs

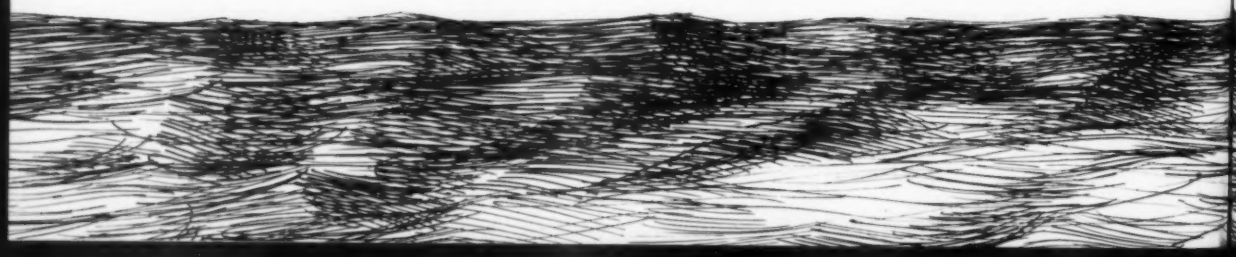
After discussing the problem, the council offers the following recommendations as a partial solution:

- All Ship's Department Heads and Embarked Unit Commanders are frequently to instruct their officers and men to stay clear of the flight deck during flight operations. Also, not to run to the flight deck when the crash or fire alarm is sounded.
- That frequent flight deck safety items be run in the Plan of the Day.
- The Squadron Personnel be assigned fire and crash stations within the Air Department.
- Squadron personnel working on the flight deck be included in the damage control lectures in the future.
- Combat Cargo Personnel (purple shirts) be assigned an emergency station; as indicated in forthcoming BOXER instruction.
- Master at Arms continue their efforts to keep unauthorized individuals clear of the flight deck.
- All personnel be more cautious around the elevators.

√ When the warning horn blows, it means the elevator is going to move immediately.

√ Don't jump on or off the elevator, stand fast.

√ Don't lean on the elevator guard rails. They are hydraulically operated and may fail at any time. These warnings to be published in the POD. —*USS* BOXER



Relative Wind and Carrier Accidents

When reporting the relative wind in Section C3, Part I or Section B2d, Part II of OpNav Report 3750-1 of carrier accidents, the pertinent instructions on the reverse of the form must be complied with. The wind must be reported RELATIVE TO THE ANGLE DECK, where applicable, NOT relative to the ship's head. Reports are still being forwarded listing a relative wind of 000 degrees while the narrative portion of the report discusses at some length the crosswind. Until such time as consistently accurate reports are submitted it will be impossible to arrive at any factual conclusions concerning the effects of crosswind on carrier landings.

Hangar Deck Crunches

On the subject of minor hangar deck crunches a policy was advocated of "how far apart can we leave them" rather than "how close can we squeeze them."—*USS* LAKE CHAMPLAIN

Lightning Strikes

Recent incidents of aircraft being struck by lightning in the Mediterranean were cited. It was noted that in each instance electronic equipment that was not being operated was undamaged. The following measures to minimize this hazard were recommended:

(1) Insure that all static wicks are intact on control surfaces.

(2) Reel in trailing wire antennas during flight in the vicinity of electrical disturbances.

(3) Turn off electronic equipment which is not essential.

(4) Utilize radar to avoid thunderstorm areas.

(5) GCA controllers avoid giving vectors into dense precipitation areas when possible.—*ELM Area*

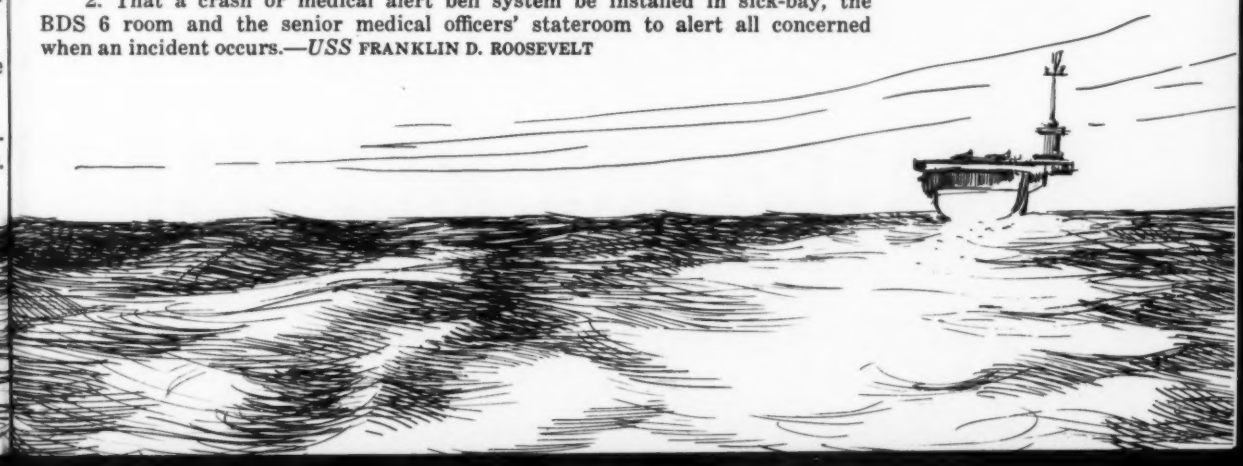
Flight Surgeons' Station

The pros and cons of requiring a flight surgeon to be on the flight deck during all landing phases were discussed. It was brought out that the medical representatives on the flight deck were capable of handling all immediate first aid that would be possible on the flight deck and that flight surgeons were on call at all times.

Recommendations:

1. The flight surgeons continue to stand by in sick-bay where they could perform their other duties.

2. That a crash or medical alert bell system be installed in sick-bay, the BDS 6 room and the senior medical officers' stateroom to alert all concerned when an incident occurs.—*USS* FRANKLIN D. ROOSEVELT



MATCH FOR MET MAN

by DAVID WEST

THE MET officer's job in the Air Force is not an easy one at the best of times. During the war it was more often than not a thankless job. From the observations he worked from, he could only give an estimate of what the weather might be like in the next few hours. In wartime England he was very much handicapped, for to my knowledge, his "obs," instead of being up-to-date, were many hours old, and it was not possible to say what weather would prevail a few miles away.

To overcome this the met officer would often telephone the stations within the area he was interested in.

I came across this phenomenon one day when I was on Control duty at Turweston aerodrome in Northamptonshire. In the afternoon it suddenly started raining cats and dogs, but there was no sign of such a forecast in the met report. For fun, I 'phoned the met blokes at the main aerodrome at Silverstone two miles away, and asked "What's the weather going to be?" The answer came back "Oh, nice and fine like it is now. It will stay like it is for a few hours." I waited a moment, and then "Fine my foot," I replied. "It's raining to beat the band here, and looks like keeping that way." There was dead silence for a few moments, and then came "You are kidding aren't you?"

I guessed that was coming, and I told him to look out of his window towards Turweston. After a short while, he was on the 'phone to say that he couldn't believe it, as it was not shown on his charts; and then he told me that his 'obs' were not up-to-date by 40 hours.

With all due respects to the 'met bods,' it has been my experience that the only way to get a line on local weather is to talk to the yokels, who have lived there all their lives.

I have had several experiences in this direction, the most outstanding one when I was a Flying Control Officer at Coningsby Aerodrome in Lincolnshire in the spring of 1942.

As many airmen know, this part of England is as flat as a pancake with no hills or trees to break the wind.

Naturally when I was posted there, I asked some colleagues what it was like, and was told it was "miles and miles of nothing," but those were not the words used; I could not print them.

Coningsby was all they said and more, and at the time of this episode, the wind had been blowing icy cold and steady for days and nights on end, and was getting a bit irksome. It certainly put me in a bad mood. I cannot remember from which direction the wind blew, but it was no doubt from the north-east.

I was returning to the aerodrome from the village one afternoon about 4:30, with the wind beating into my face, when I spotted a farmer chap approaching me along the road. As we drew abreast, I said, "A bitter cold wind, isn't it?" I expected only a "Yes" or "Aye," but the farmer stopped and wanted to make something out of it. "Aye" he replied "It's a mighty cold 'un," and then after a pause he continued "If it don't stop soon after sundown we'll have a heavy fall of snow before morning." This surprised me, and I said "Snow! Why there isn't any indicated for miles around." I was remembering what the Met bloke had said at lunch time.

But the old chap was adamant. "Mark my words," he said "This wind has been blowing steady for over three days now, and when it does that from the same direction, snow is sure to follow, and if the wind don't drop, there'll be snow before morning. You'll see. I've lived in these parts for forty years and I know."

This *was* intriguing news for me, because the question of snow falling had come up at lunch time, and was pooh-poohed by the met blokes. I continued to talk to the old chap, in spite of the driving blast of icy wind, and I soon became as convinced as he was that snow would fall if the wind did not drop; he even named the time of 9 p.m. for the wind to drop—or else.

As I continued my journey to the airfield, an intriguing thought came to me, but I could not exploit it until after 9 p.m., and that was four hours to wait.

I went into supper late that evening, and was enjoying a drink in the mess afterwards, when a met bloke came in. Someone remarked that they were fed up with the icy wind, and would welcome a fall of snow, as it might then be warmer. The met bloke just said "Don't worry, there's no sign of snow," and went into his supper.

At NINE o'clock, I went outside the building, and was greeted with a colder blast of wind than ever. Without further ado, I donned my heavy coat and muffler, and fought my way to the watch office. The met room was on the ground floor, and I went in.

There were two weather bods on duty, and I got the usual greeting, which was "Cup of tea, Tubby?"

While I was enjoying this, I broached the subject of the weather, and said "I think it will snow before morning," at the same time trying to look weatherwise by studying the latest met charts on the wall. All I got in the way of conversation was "You're daft."

I then put on the act of making a further study of the weather charts and teletype gen, and after

a few moments said with a feeling of uneasiness "Well chaps, according to my reading of the charts, we shall get a heavy snow fall before morning, and what is more, I'll bet five shillings on it."

The two blokes took this up immediately, and one of them 'phoned the control room upstairs to tell them what I had said, adding "He's nuts of course."

The result of this was that I had my five shillings covered four times.

When the excitement had died down, the general discussion was, "Why had I made such an opposite forecast to all the known facts?" They even got through to Group Headquarters to air the situation, and on the strength of what they were told, they thought I was completely mad. I'll admit I felt a little worried, but I had faith in the 'locals.'

It was near midnight when I went to bed. The wind was still howling and colder than ever, if that could be.

I fell asleep while I was going over the events of the evening—with some little doubts I think—but I convinced myself that the farmer would be right.

When I awoke, the aerodrome was blanketed in deep snow, and it was still falling. In fact it snowed for the rest of the day, but the wind died down.

That morning I was on duty at the watch office, and had the pleasure of collecting my twenty shillings, but there were a lot of sly remarks about the new "weather wizard" who had appeared from nowhere. The news of the bets soon leaked out, and even got to Group Headquarters, from where a couple of 'phone calls came that day, suggesting that I might do better in the Met Section. Flight commanders began to tax me about it, and I really knew very little about met—it was for a time one of my weak subjects—I was in an awkward spot.

The snow stayed for about a week, and then began to melt. It cleared from the branches of the trees, and while this was going on I happened to be taking tea with a farmer and his wife. I remarked that I was glad to see the snow going as it had been so cold. The farmer answered by saying "Take a look at the underside of the branches of the trees, and see if the water has formed into little beads. If it has, we shall have another heavy fall of snow before it clears away."

I went out to investigate, and sure enough, there were the beads of water neatly spaced along the underside of the branches. Naturally I was intrigued with this discovery, and felt that I should know more about it. The farmer told me that if this happened after the kind of snowstorm we had experienced, it was always a sign of more snow to come, and although it seemed strange, I believed him. In fact the more we talked about it, the more convinced I was about what would soon happen.

I gathered that the new fall of snow could come at any time, and so that night I visited the met office again, but I did not get a very chummy reception.

I hoped that one of the bods would broach the snow subject again, but they were mum, and I had to start the ball rolling, for I was determined to try and cash in again on the new prediction I was about to make.

Studying the charts on the wall, and the teletype weather news, I asked, "What's the weather forecast?"

With a critical look one of them said "As if you didn't know; in any case you've had your snow, there's no more coming," and laughed. This of course was a tailor made answer for me, and I immediately said "Well, from the look of the reports, there's bound to be another substantial fall of snow before it finally clears away." At that, my remark was greeted with loud laughter, and I was told I was pots.

Straight away, I offered to bet again, but this time there were no takers. I made good play on this turn of events, and told them that they could not be very sure of themselves if they did not take me up, but they would not bet. Three of the others in the watch office however, covered me for five shillings each.

This new forecast of mine was soon known all over the mess that night, and a lot of good banter was the result.

Next day the snow continued to melt, the weather seemed to be warmer, and I began to feel that, this time, I had been too trustful of local weather lore.

I needn't have worried though, for that night, there was a heavy fall again, in spite of warm fronts and changing winds which the met men had been talking about.

Of course, the next day, my prowess as a weather man was well-nigh impregnable, and things became awkward too, because people wanted to know how I could be so accurate. Somehow I was able to palm them off, and I certainly basked in false fame for the remainder of my stay at Coningsby, but I did not let on as to how I had done it.

A few weeks later I was posted to Upwood, and took the secret with me. Later while I was stationed at Silverstone, one of the Coningsby types, whom I had forgotten, was in the mess, and on spotting me, came up and said "Why, it's Squadron Leader Snowman," and the story was told again.

This account of the affair, however, is the first time I have set it down in print, and I have no doubt that some Coningsby bods who see it will recall the incident.—*Courtesy "AIR FACTS," private pilots magazine.* ●

TARGET FOR TODAY

OUR SNB-5P was assigned to work with a destroyer on a photo mission involving the shell splash pattern around a towed sled target. When I arrived on station the ceiling was 600 to 700 feet, broken to overcast, with about 7 to 10 miles visibility. Due to this condition I requested the destroyer to give me a 10 to 30 second standby so I could maneuver to the back side for photographing the splashes on the target.

The first salvo went fine as I was on the back side of the target in good position. As I circled around the target to get in position for another salvo the aircraft pitched and bucked and splashes were observed around the towed sled. When this happened I called the tin can and informed them of what happened. They answered that they were sorry, they forget to give me a warning standby on the salvo which had just been fired.

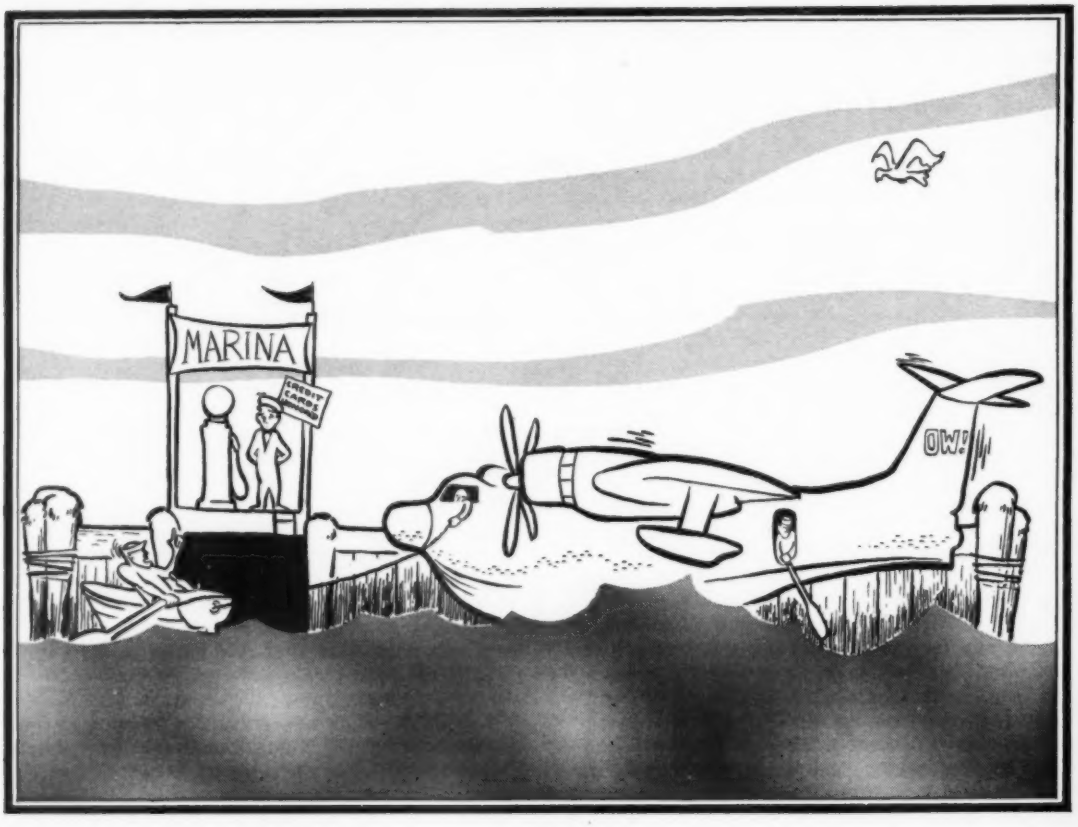
Under the circumstances I told them I would no longer take pictures with the weather conditions such as they were. (We believe you told them this Anymouse, but not just because of the weather—The Editors.)

I experienced no difficulty in flying the aircraft but after landing back at the base a hole was observed in the top of the horizontal stabilizer. With further probing it was found that a large piece of five-inch shell was lodged in the horizontal stabilizer and had broken part of the elevator bracket and rudder bellcrank.

Anymouse continued next page

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Forms for writing Anymouse Reports and mailing envelopes are available in ready-rooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —



OVERBOARD

RETURNING to base on a single engine, our P5M was forced to land 10 miles short of the seadrome due to fuel starvation (this sounds better than admitting we just ran out of gas).

The landing was actually made with power but shortly after touchdown the tanks ran dry. We completed our trip at the end of a towline. Fortunately the weather was CAVU and water conditions smooth otherwise the ending might have been a bit different.

The most interesting part of the story is how we blundered into a situation like this in the first place. As usual, the opening action gave no hint that anything unusual was about to take place. Two hours after takeoff the pilot had decided to return to base because of a dead cylinder in one engine. The boat had been fueled to 3300 gallons for this flight so we started jettisoning fuel to get down to single-engine weight.

When we were within 50 miles of home the starboard engine had to be feathered due to violent torquing. Shortly afterward the radioman reported an oil leak in the port engine. With this the pilot ordered the droppable bomb-bay tank jettisoned as well as all the remaining fuel in the hull and auxiliary tanks.

When about 15 miles from base the pilot noticed there was less than 500 pounds of fuel in the no. 1 main service tank. The no. 2 main service tank indicated 1350 pounds but we were unable to transfer any fuel from there to no. 1 service tank or directly to the port engine. As the reading on the no. 1 tank passed the 300-pound mark the pilot commenced a landing approach from an altitude of 400 feet.

During the letdown the remaining engine stopped momentarily and all AC electrical power was lost for the remainder of the landing. Fuel was so low that even the APU was not operating.

Had we been able to crossfeed the indicated fuel in the no. 2 tank we could have gotten home under our own power but it seems the tank was actually

empty. The gage had malfunctioned.

Our trouble came from an inadequate reserve of fuel to keep the service tanks full though on subsequent flights it was discovered that the mech who had been working the fuel panel on this particular flight was using an unorthodox way of securing jettisoning operations. He would first pull out the circuit breaker and then turn the switch off. This does not stop the jettisoning of fuel since the circuit is broken and all the valves remain in the same position. If circuit breakers are to be used as an added safety measure it is mandatory that circuits be secured in proper sequence, with circuit breakers *last*.

INTREPID AVIATOR

THOUGH I consider myself a reasonably intrepid aviator with 3500 plus hours covering TBFs to FJ-4s, I am still subject to stupid stunts now and then. Example: daylight with one friendly (that's me) and one bogey. The bogey was assigned 36 thousand and the friendly (me again) had 34 thousand.

I was puzzled by the altitude assignment—the friendly could have used the altitude advantage. Then GCI reported a bogey at 40 miles. Well, I thought, I'll just ease up a couple thousand feet and get above him.

"Your bogey now 15 miles," called GCI. Say, he's closing pretty fast, I'd better pull it on up. "Your bogey now 5 miles, appears to be approaching head on." No kidding. Well, I'm passing through 36M now so I ought to be on top of him real quick.

Several moments later a high-volume yell came through my ear phones. "SWEET JUMPING JEHOSHEPHAT! I didn't miss him more than six feet." I wondered what the bogey was talking about, I hadn't seen a thing. All of a sudden I knew what he had missed by six feet—me, dat who!

Conclusions: At a combined closing speed of mach 1.63 you won't see much and if you do, it's too cotton-picking late. So don't die all tensed up. If you decide to change altitude let the controlling people know. ●

WHIZ QUIZ

See WHIZ QUIZ answers on page 48

1. A serious icing condition may occur in a drizzle if the cloud temperature is colder than _____.

2. Icing in cumuliform clouds is normally _____ than that in stratiform clouds at the same temperature.

3. In an area of steady rain or snow, can you expect only light icing in the layer where temperatures are 0°C to —10°C?

4. Are axial flow compressor type turbo-jet engines seriously affected by the same atmospheric conditions which cause wing icing?

5. If your aircraft encounters icing conditions and is not equipped with wing deicers, you should _____.

6. One of the factors influencing the rate of deposit of ice on an aircraft is the airspeed. True or false?

7. Is icing, in clouds over mountainous areas more intense on the windward side and over the crests, than on the leeward side?

8. _____ ice may be expected in stratus clouds where vertical currents are of insufficient strength to support large drops.

9. The _____ _____ position should be used when flying in any conditions conducive to the formation of induction ice.

10. All naval aircraft utilizing float type carburetors will use the _____ system when flying in any conditions conducive to the formation of ice.

11. Jet engine icing will occur under the same conditions as _____.

12. The most serious icing will be encountered in areas of_____.

13. If you were taking off in icing conditions would you turn your de-icers on?

14. Crosswind landings on icy runways require good timing and excellent judgment. You should compensate for _____ before you touchdown.

15. In stratiform clouds at temperatures colder than —10°C, you can expect icing intensities to _____ as you progress toward areas of colder temperatures.

(Answers pg. 48)

Have a problem, or a question?

Send it to HEADMOUSE

he'll do his best to help.

Instruction Goof-up

Dear Headmouse:

Re July 1960 APPROACH, p 2, concerning BuWeps Inst. 13910.1. Neither this squadron or its parent group has the instruction. Request a copy be sent to this squadron if available. We are in need of computers for OE-1 and HOK aircraft.

O. M. DIAZ
Aviation Safety Officer

VMO-2 MAG-16

Dear Headmouse:

You mention BuWeps Inst. 13910.1 listing various computers for fixed and rotary winged aircraft. I find SecNav Inst. 5215.10 (Reclassification of Instructions) lists it as old NavAer 05.7 which describes G-2 compass setting procedures. What do I do now?

ARCH T. WEST, LT

Pt. Mugu

Dear Headmouse:

Is it possible you quoted the wrong instruction for the computers?

WALTER S. FIELDS, ENS

VU-5

► SecNav Instruction 5215.10 attempted to renumber the old NavAeroos and NavAer Instructions to bring them under the NavWeps reorganization. This attempt was not 100 percent successful.

Both NavAer Instruction 13910.1 *and* NavAeroo 05.7 were renumbered BuWeps Instruction 13910.1. So that indicates that one or the other was intended to be cancelled or that one or the other was misnumbered.

Looking just at the dates involved shows one thing for sure —there is a valid BuWeps Instruction 13910.1 and it is on the subject of Aircraft Cruise Control and Performance Computer, Data Tabulator and Card Devices (copies were forwarded). This instruction is dated 2 June.

Very resp'y,
HEADMOUSE

Flight Clearance

Dear Headmouse:

In a little-read paragraph on page II-3 of the FLIP Document, it is stated that: "A Navy pilot is cleared from Air Force fields in accordance with Navy directives. the Air Force C.O. acting as if he were the C.O. of the Naval Air Station in his function as clearing authority." OpNavInst 3710.7A, paragraph IV, 1. c states: "When not at a Naval Activ.ty, . . . , the pilot in command of a naval aircraft is authorized to approve flight clearance for his proposed flight or modification thereof."

The latter quote has been the justification for Navy white card holders signing their own flight plans when filing from Air Force fields. It is the consensus of opinion of the Air Force operations and clearance officers whom I have questioned on this subject, that Air Force Operations Duty Officers should clear all Navy Standard pilots. With which of these directions is a Navy Aviator supposed to comply?

CAPT, USMC

NAAS, Kingsville, Texas

► The Naval Aviator is, first and foremost, governed by Navy directives. Therefore, it seems logical that the OpNav reference should be most applicable. Really see no great conflict here. The Navy simply says that their White card pilots *can* clear themselves under certain circumstances just as their Green card pilots *can* clear themselves under less restrictive circumstances. The FLIP simply offers the Air Force Base Commander as alternate clearing authority in place of the Naval Air Station Commander. Any cross-purpose is definitely on the NA/AO level . . . personalities.

Very resp'y,
HEADMOUSE

Safety Officer Utilization

Dear Headmouse:

I have just finished reading NASC report 6061, (Readiness Through Safety), and a problem has been brought to my mind which needs some positive action. This is it: the operating squadrons are for the most part using officers who have had ASO training in other billets, rather than safety!! This is undermining the "backbone" of our safety program tremendously.

Local thinking goes like this:

1) Joe is too senior to be "just" a Safety Officer. Let's give him a department or,

2) We *need* Joe in maintenance (etc.), even if he's been to safety school. We don't have enough experienced people to "spare" him for safety. Guess who gets "safety?" The guy who didn't fit in as a department head!! (Not experienced enough, you know.)

Don't take my word for it. Check around.

Now, I suggest all this Mickey Mouse be brought to a screeching halt like so:

1) Promulgate a directive *requiring* formally trained ASO's to be given that billet in the squadrons. Should the command feel they "need" him in another slot they can cry to BuPers. We cannot afford not to use these people!!

2) Publish an appropriate blurb

Each copy of APPROACH is meant for twelve readers. PASS IT ALONG!

in your pubs emphasizing the fact that the billet of safety is of extreme importance for our goals, and that *it is* a fairly *senior billet.*

3) Require a letter to NASC explaining any instance of non-compliance. (If the CO's won't see things our way, we scare 'em, see?)

I've just dashed this off in a spare moment—and I'm sure there are a lot of problems that might have escaped me in this business of billeting—*BUT* this problem exists. Could we have a go at it?

WORRYMOUSE

► Worrymouse—You have certainly hit the nail right on the head! The fact that there are numerous graduates of the Aviation Safety Officer's school who are not being utilized as aviation safety officers is a problem which has been recognized for some time. The following is proof of the fact that the higher echelons are aware of this problem. OpNav Inst 3750.14 of 22 May '59 states, "All ships, staffs and stations concerned with the operation of aircraft, and all operational squadrons shall have at least one naval aviator assigned as Aviation Safety Officer. This officer should be the direct representative of the Commander and shall be a graduate of the Aviation Safety Officer's Course at the University of Southern California whenever practicable . . . "

Information available to CNO indicated that there was considerable variation in interpreting and implementing the above requirement. It was apparent that more definite instructions were needed in order to clarify and standardize the status and position of aviation safety officers in various commands. Therefore on 28 March 1960 CNO letter serial 649P05 to the Chief of Naval Personnel "requested that the Commandant of the Marine Corps and BuPers establish the primary billet of Aviation Safety Officer for each shore organization under their respective cognizance. It is considered that the Aviation Safety Officer should have the status and rank of a head of department."

On the same day CNO sent a similar letter serial 650P05 to ComNavAirLant, ComNavAirPac, CG AirFMFLant, CG AirFMFPac and CNATra. The following is quoted from that letter: "Insofar as practicable it appears desirable that the billet of Aviation Safety Officer be established in the Manpower Authorization/Table of Organization for each aviation unit, staff and ship. In general it does not appear possible to increase allowances therefore, and that, in most cases the deletion of a currently authorized billet in compensation would be necessary. It is further considered that, with the possible exception of ships, the Aviation Safety Officer should have status equivalent to a Head of Department and be of commensurate rank."

Included in this same letter were questions as to whether the ASO should be a primary or collateral duty, and the status and rank of the ASO. The answers were unanimous in specifying the ASO as a primary duty billet — particularly in operating squadrons. For the most part the replies indicated that the safety officer in an operational squadron should be a LCDR or LT, depending on the size of the squadron, with status equivalent to a Department Head under the Commanding Officer.

So you see Worrymouse, there are teeth in these directives which emanate right from topside. If your commanding officer has a USC safety officer graduate in the squadron and the ASO billet is being filled by someone other than this graduate, he is not complying with the spirit and intent of OpNavInst 3750.14.

Very resp'y,
HEADMOUSE

Mail your questions to:

HEADMOUSE

U. S. Naval Aviation Safety Center

Norfolk 11, Virginia

Suiting the Crew

Dear Headmouse:

I would appreciate any suggestions on how to keep enlisted flight crewmembers who fly 4 to 5 hops per week in clean flight suits. The crewmembers are more prone than pilots to getting flight suits dirty and oil saturated and yet equally exposed to aviation hazards in which a clean suit would be a necessity.

Two suits per man (as pilots are allowed) seems the obvious answer but I quite often have trouble even procuring one per man of proper fit.

VP TYPE LINE DIV. OFF.

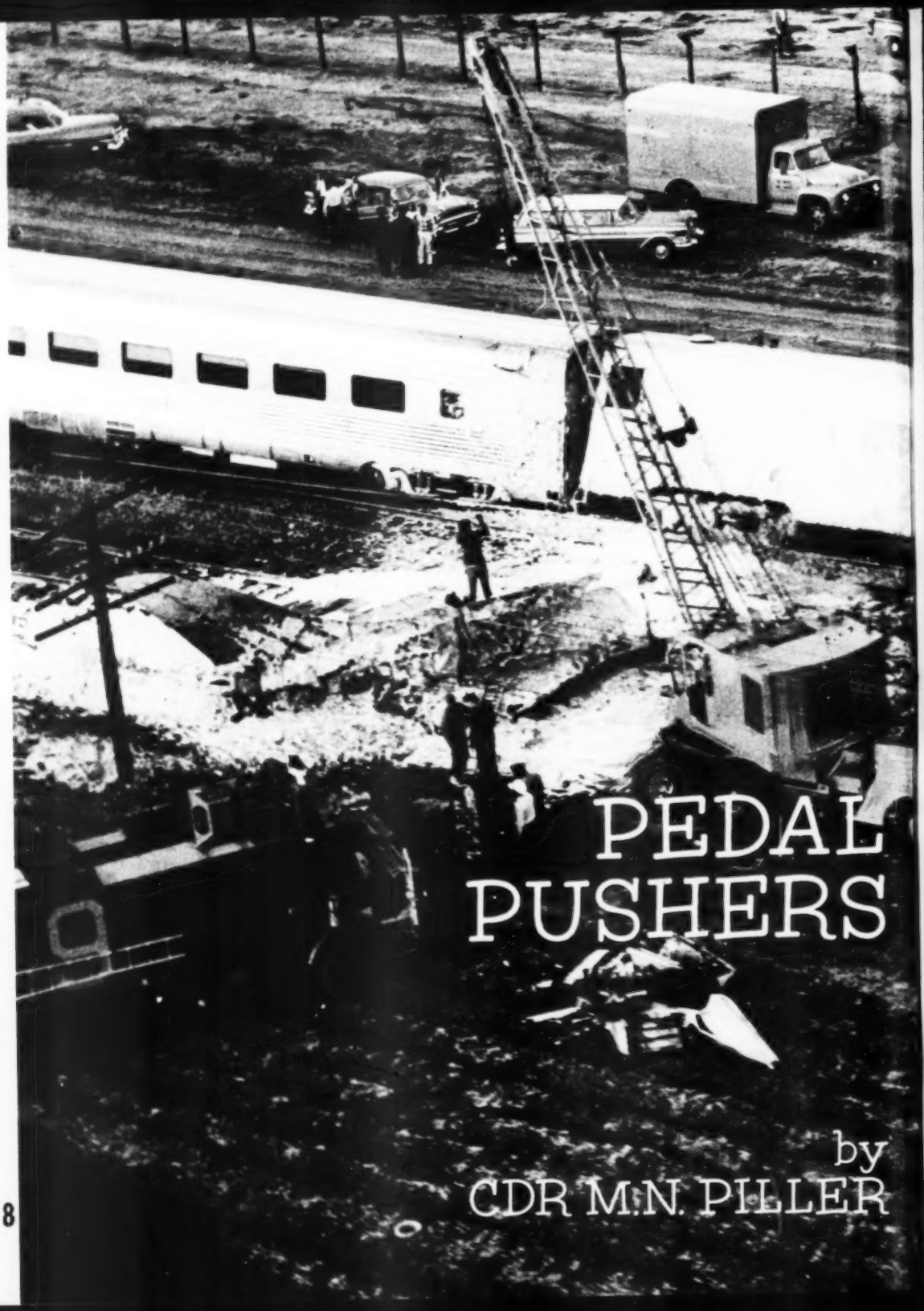
► Section H Allowance List promulgated by BuWeps (Publication NAVWEPS 00-35QH-2) lists Flight Operational Material for Aircraft Squadrons Navy & Marine Corps.

On page 15, where summer flying suits are itemized, each squadron/activity is allowed 120% of non-pilot crewmembers of assigned aircraft, plus an additional 100% when operating in tropical climate.

Consequently, on an aircraft operating with 5 non-pilot crewmembers, 6 suits are allowed. If operating in tropical climates, 12 would be allowed. A tropical type climate is encountered in most parts of the world at least part of each year; thus, two suits per man are possible. The suits are issued on custody chits to the individual but the property, itself, technically remains with the government.

As for correct sizes, it may be that your supplying activity did not have an adequate stock of common sizes. There are plenty of most sizes in the supply system itself as of this writing.

Very resp'y,
HEADMOUSE



PEDAL PUSHERS

by
CDR M.N. PILLER

Proper pedal pushing is the primary means for stopping your bird short of the tracks.

"WHEN I looked up I was resting on the railroad tracks," was the last sentence of the pilot's statement which is quoted, in part, below:

"The engine was at idle on final when I came across the end of the runway at approximately 160 knots. There were about 4200 pounds of fuel indicated on board. Touchdown was some 1000' down the runway and I attempted to start braking. There was momentary braking action and then I felt the brakes go out. I came around the horn with both throttles and continued to push on the brakes. It was obvious that I was going to leave the end of the runway so I turned off the main fuel switches. The aircraft hit the fence and my head went forward."

From the above how many mistakes did the fighter pilot in our story make that you can spot just by reading his short statement? There are three obvious ones and there may have been more that don't show here.

► Too fast—160 knots.

► Too heavy—4200 pounds of fuel.

► Too soon—attempted to start braking right at touchdown which burns out brakes real quickly.

Many articles have been written describing the energy required to stop a plane on the runway. This energy has been converted into a number of unusual quantities: the heat required to melt steel ingots; the horsepower required to raise the freight elevator in the Pentagon five stories; the thrust required to put a baseball into motion and other impressive variations. Naturally, very few of these examples are easily converted—mentally—to the problem of stopping an aircraft.

Looking into the factors involved in stopping the aircraft under less than optimum conditions we find the following items in order of importance that must be seriously considered:

Speed. This is the key to the eventual stopping of the plane. Kinetic energy is directly proportional to the square of the speed at touchdown. Double touchdown speed and stopping distance will be quadrupled.

Braking (wheel) effectiveness. Operation of wheel brakes to give maximum available tire to ground friction coefficient throughout the ground run would produce the highest aircraft deceleration with subsequent shortest rollout. The maximum friction coefficient occurs at what is generally called the incipient skidding condition. But due to brake application techniques (human factor—except for anti-skid devices) the maximum friction condition is appreciably less than maximum available. It is estimated that pilot controlled braking is between 30 to 50 percent of maximum available while anti-skid controlled braking may be as high as 60 to 80 percent of maximum available tire friction coefficient. On a wet runway where the coefficient of friction is halved the rollout distance will be approximately doubled.

The most probable reason for the reduced efficiency of pilot controlled braking is the pilot's concern about blowing tires. This is a good and valid concern, as experience has shown that the pilot can and has blown tires of every model jet aircraft in the Navy. The best that can be said about pilot controlled braking is that if the pilot can continue with his normal braking (30-50 percent) until the airplane has been slowed and before his anxiety causes him to blow the tire(s) or set up a skid, he will have a better chance to keep from going off the side and breaking up his bird.

Flaps. Although the load on the main wheels is increased appreciably by raising the flaps thereby giving better "theoretical" braking force we are again faced with the tire blowing probability. In addition, the drag created by leaving the flaps down is greater than the increased brake effectiveness. Test results published by NASA at Langley Field, Virginia, concluded that with the sweptwing fighter the *stopping distance would be increased appreciably by instantaneous flap retraction* under normal braking efficiency and average tire to ground coefficient of friction.

Drag chutes. These are excellent retarding devices at high speeds but fall off in effectiveness as the square of the speed. Not many of our aircraft are equipped with this item at present. Primarily the chute is a tire, wheel and brake saver. It is *not* designed to give you additional approach and touchdown speed. Once again, if you are not "on speed" don't depend on your drag chute to give you your initial retardation. Take it around! In the event the chute fails, and there have been some recorded failures, drop your hook and get on the brakes. The energy has to be dissipated and your brakes are still the best device on the plane for that purpose. To date no aircraft in the inventory has been designed requiring the drag chute to stop it in lieu of the brakes.

Aerodynamic braking. For a given aircraft—let's say a sweptwing fighter—on its correct speed at touchdown the maximum retarding force of wheel braking would be about 900 pounds while the retarding force of aerodynamic braking at that in-

stant would be about 2700 pounds providing a *minimum* angle of attack of 15 degrees can be maintained.

Aerodynamic braking would be a very fine thing indeed *if* you could cock your airplane up to about 20 degrees (not less than 15 degrees) *and keep it there.* But the fact of the matter is that there isn't one aircraft currently on the list that will allow you much over 15 degrees angle of attack during rollout. The effective retarding force due to aerodynamic braking is appreciably less than wheel braking. Any nose-high attitude after touchdown will only tend to increase the rollout distance.

On a water covered runway where the coefficient of friction is extremely low there exists the possibility of planing. And when the wheels are planing the brakes are not effective for either turning or stopping (like your wheels are water skis). A nose-high attitude (aerodynamic braking) on a water covered runway would in all probability aggravate the planing potential. Inasmuch as there is so little friction to begin with, it is incumbent on the pilot to get all three wheels on the runway as soon as possible in order to reduce the chance of having the aircraft go out of control due to planing.

Besides having zero coefficient of friction, probably the most serious aspect of the planing aircraft is the fact that yaw control is absolutely nil once rudder effectiveness is lost. It doesn't take too much imagination to visualize a plane slewing down the runway then suddenly losing its planing characteristic. The side loading imposed upon hitting a dry spot could easily cause immediate damage to the landing gear or even collapse.

Residual thrust. Although not much in terms of effective braking conditions, it is of sufficient value to embarrass the pilot in the nip and tuck situation. One thing for certain, it is of no help in retardation! For instance the idling J-57 has about 600 pounds of thrust that must be overcome in order to stop. So if the runway is slick you will want to get rid of all unnecessary thrust. Bring it around the horn! Remember, without brakes a plane with an idling engine would continue to roll until it ran out of gas or was stopped by some other retarding force (such as a drainage ditch at the end of the runway).

Speed brakes. Speed brakes having an area of 5 percent of the wing area—which are rather large—increase the aircraft drag coefficient about 0.05 and reduce the ground rollout.

Drag in all forms, including aerodynamic braking, drag chutes . . . will not stop the airplane! Wheel brakes must be employed.

Flaps down, speed brakes out (in models where possible) and drag chutes will shorten the landing rollout distance. But even on the longest of runways these items used individually or collectively will not completely stop the plane. Although the residual thrust of the turbo jet engine is not much, as long as it is acting it will have to be overcome by wheel braking.

Probably the most overrated item in stopping is aerodynamic braking. True, at instant of touchdown it is more effective than wheel braking but when averaged over the length of the runway it contributes only a small portion of the overall retardant force. The danger of utilizing it on water covered or slick runways (friction coefficients between .05 and .2) outweighs its merit.

One final word on braking—not on landing but aborts. Some pilots are used to being able to stop their particular planes within 5000 feet after touchdown. So they figure that it is as easy as falling off the proverbial log. Why should it be so difficult to abort.

There is a good reason. While screaming down the runway and you pass your refusal point just a little slow you start to wonder if there is something wrong. You recheck the instruments and take a quick look around outside to determine if you can see anything wrong. Naturally, by this time you have had it—but why? You may still have 5000 feet left. All these landings that you have been making so nicely have been at a *much lighter gross weight.* If you don't have your computed speed at the refusal point position that is the time to get on the binders and initiate your abort—not a few seconds or a couple of thousand feet later.

Hooks should always be lowered by the pilot if there is any doubt in being able to stop in time. It might be worthwhile to mention here that the standard MA1A barrier in the down position may be effectively used by tailhook aircraft. When the barrier is in the raised position the pilot must remember to bring up his speed brakes and jettison any underslung external stores such as fuel tanks and the like.

Don't forget—after an abort you will undoubtedly have hot tires, wheels and brakes. BuAer speedletter of 13 April 1959 directs that the *fire department be alerted and other ground personnel be advised to stand clear.*

Let's check into the factors that we have to work with in order to stop these big iron birds—$KE = 1/2MV^2$. Where KE is kinetic energy, M is the mass (the aircraft) and V^2 is the touchdown speed squared. You can see that touchdown speed is vitally important.

Below is a graphic illustration of the mean values of maximum available tire friction coefficient for various runway surfaces.

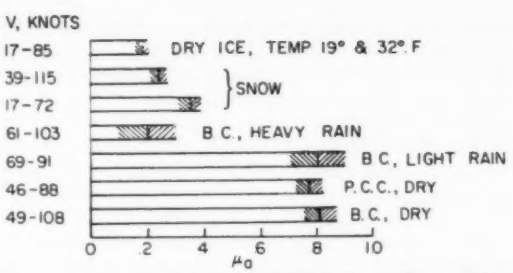


Fig. 1. Mean values of maximum available tire friction coefficient μ_a for various runway surfaces. Value of standard deviation shown as shaded area about the mean. Abbreviation B.C. refers to bituminous concrete and P.C.C. to portland cement concrete.

So much for the landing surfaces. Now let's take a look at braking design. Brakes are capable of producing a maximum retarding force of from 20 to 40 percent of the aircraft weight (0.2W to 0.4W). With this information we can graphically illustrate the effect of brake capacity on stopping distance S with respect to braking efficiency.

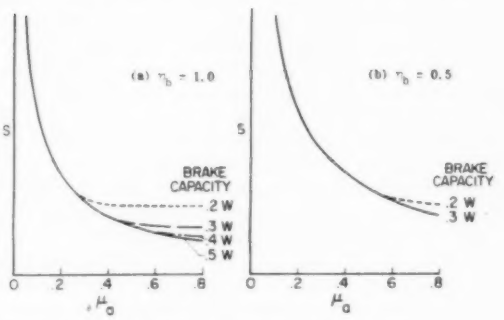


Fig. 2. Effect of brake capacity on stopping distance.

Material for this discussion of aircraft braking problems was obtained by Cdr. Piller from a number of sources. The key non-Navy document is AGARD Report 231, "Ground Deceleration and Stopping of Large Aircraft," written by John A. Zalovcik, of NASA, Langley Research Center. Those desiring to delve deeper into the problem may write NASA, 1512 H Street, N. W., Washington 25, D. C. for a copy of the 32 page report, based on Mr. Zalovcik's presentation to the October 1958 Flight Test Panel meeting in Denmark. For other Navy data on braking, check your safety officer's APPROACH *file for "The Long and Short of It," June '57, written by another talented tiger by the name of Cdr. Carl A. Brown.*

Note the two side-by-side graphs represent braking efficiency N_b plotted against rollout distance. $N_b = \mu b/\mu b$ or airplane braking coefficient over max available tire friction coefficient.

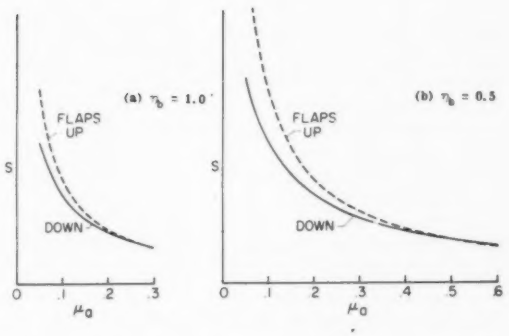


Fig. 3. Effect of flaps on stopping distance of a swept-wing fighter.

Notice that with good pilot braking effectiveness (.5) that the drag created by leaving the flaps down appreciably shortens the rollout distance.

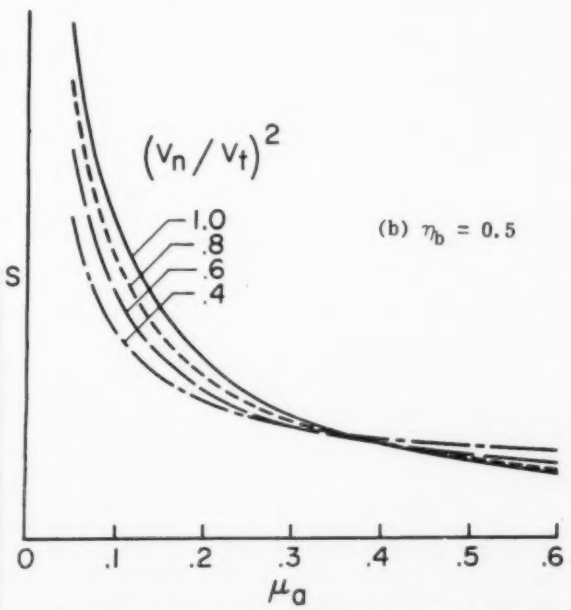


Fig. 4. Effect of nose-high attitude angle on stopping distance of a delta-wing fighter: $\alpha_m = 20°$.

Continued next page

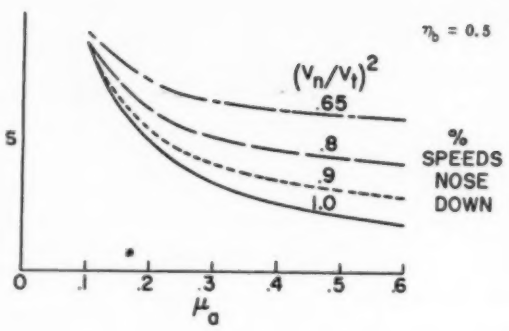


Fig. 5. Effect of nose-high attitude angle on stopping distance of a delta-wing fighter: $\alpha_m = A/A = 10°$.

Note that unless you have an aircraft that can be cocked up to 20 degrees angle of attack (A/A) that holding the nose off the runway will only lengthen the rollout distance.

Examine now the problem of stopping aircraft right down the line from the normal every day type of stop to those that get real hairy.

The normal landing made under normal conditions. What constitutes normal conditions? A good pilot in a good plane on a good runway. After touchdown the idea besides stopping the plane is to conserve tires and brakes if you can arrange it.

Why worry about a $50 tire or a $2.50 brake puck when you should concern yourself about a $1,000,000 plane. If you hit the brakes too soon or too hard you could blow a tire and go off the side of the runway. Now you *are* concerned about the $1,000,000 airplane! The $2.50 brake pucks—well, they are energy dissipators that form all those BTUs that have been used statistically to raise elevators, melt steel . . . and in your case they can, and do, heat wheels to the point where they explode. And now we are back to the $1,000,000 plane again.

After a normal touchdown leave the flaps down and utilize aerodynamic braking until the touchdown speed has dropped off a bit. Aerodynamic braking is only effective at high speeds. As your speed drops off the effectiveness of aerodynamic braking falls off faster. Slowing the plane down initially for free—no brakes—is good piloting and reduces the blown tire probability.

After a certain point (usually about 90 to 100 knots) aerodynamic braking is ineffective even though you can still hold the nosewheel off and in some instances even drag the skag. Nevertheless, there is a certain airspeed in your rollout where aerodynamic braking is absolutely useless. In summary, on a normal landing after touchdown make the most of aerodynamic braking but don't go off the end of the runway with your nosewheel high in the air still thinking that you are getting something for nothing.

The fast landing. What constitutes a fast landing? What may be fast for the *T-bird* might cause a *Crusader* to spin in! You must know right down to the last knot the proper approach and landing speed for your model aircraft. Suppose you are just a little fast, not hot, just a few knots over best touchdown speed on a long, dry runway. Then with judicious use of aerodynamic and wheel braking you can stop without too much trouble. Leave the flaps down and hold the nose up while intermittently applying maximum wheel brakes without skidding the tires. If you hold your brakes on too long you may cause them to fade, then you're really in trouble. If this happens don't forget your hook. The hook is the very best stopping device ever put on your airplane.

How about the fast landing. Not just a couple of knots but 10 percent or so above optimum landing speed. *Take it around unless you have to land.* If you are committed, then as soon as you have it safely on the ground leave your flaps down, put out speed brakes if possible, then bring your throttle around the horn and get rid of the residual thrust. Drop your hook—you are eating up runway much faster than you think. Try to maintain your rollout down the runway centerline. Off-center engagements are inherently more dangerous than dead-center engagements.

Do not apply your brakes abruptly—you will have a good chance of blowing one or more tires, going off the side of the runway, and never getting a chance to use your hook. As you slow, apply your brakes gently and evenly. If you apply your brakes abruptly when you are too fast you will peel the tires right off the wheels.

This is a good subject for readyroom discussion for your particular model aircraft because someday you might have to land fast. If you just say take it around when you are fast you are going to wind up with an uninformed pilot in the air without flaps or some other problem which will require a fast landing.

Another facet of the fast landing is the short field landing. This is usually made under duress as no one goes around the countryside looking for short runways. On some unusual occasion you may be faced with the problem and forced to accept "any port in a storm." The approach must be right on—you should be light (not too much fuel) or you would probably go someplace else. If you aren't light then burn down or dump, if possible, before you make your approach.

As we said, you should be right on speed and if you're going to shade it a knot or two then shade it on the slow side. If you put down at a civilian field then you will, in all probability, not have arresting gear. Shut down as soon as you are safely *on the runway*. After touchdown get the nose down, leave your flaps down, and put out speed brakes if possible. Start applying brakes lightly but firmly. The only way you can dissipate all of the stored KE is through your brakes. You need lots of drag and braking friction but no sliding friction like you get with a locked wheel. Ease off on your brakes to insure that you do not peel your tires by inadvertent locking of the wheels.

Be sure to check your tires, wheels and brakes after these maximum effort stops. Tires and wheels have been known to explode as much as an hour after landing due to the heat sink generated while stopping.

The next in line would be the stopping on a runway with reduced tire to ground coefficient of friction. This condition will vary with the climatic cause for the reduction in friction. Generally speaking, the touchdown speed must be at the minimum consistent with safe flight. Also, more damage to the aircraft can be expected if the touchdown is short of the runway than if the rollout results in an overrun. Specifically, on wet (not water covered or heavy rain conditions) or snow covered runways (of standard military length) there is enough tire to ground coefficient of friction to effect the normal landing—but with a little more painstaking effort on wheel braking. The requirement for the most careful use of the brakes lies in obtaining the maximum rolling friction without locking the brakes and causing sliding friction. Sliding friction on a wet or snow covered runway not only reduces the stopping quality of the tire but exposes it to the chance of being locked while hitting a dry spot on the runway with the possibility of tearing off one tire. From then on you would be asymmetrically braking and just trying to maintain the aircraft straight down the runway. On puddled runways and snow patched runways get off the brakes as you approach the puddles (and patches) as you can expect to lock your wheels. Rolling through puddles (without brakes) you can expect to get varying degrees of retardation just going through the water or light snow. As your plane slows down the effectiveness of your brakes increases.

When landing on a water covered runway or in a very heavy rain the procedure will be pretty much the same as above except that the most dangerous condition will be the planing of your main landing gear tires. The best way to reduce this possibility is to get your nose down and keep the plane going straight down the runway. Apply your wheel brakes tenderly easing off frequently. Most Navy combat aircraft are heavy enough and the tire tread narrow enough that upon releasing the brake of a planing tire it will regain contact with the runway. Realize that it takes time for the wheel to get up to rotation speed, so don't reapply your brakes too soon. Of course you have your hook down and flaps down, and anything else you can hang out.

In FY '60, about 2.1 percent of the aircraft accidents in naval aviation were the result of improper braking technique. It is believed that the underlying cause of this is the lack of appreciation of capabilities and limitations of the equipment installed on the present high-performance aircraft.

One thing is important to remember; there is a tremendous amount of energy stored up on the landing airplane. The prime dissipators of this energy are the brakes! All other means of stopping the plane are subsidiary, with the exception of the arresting hook for carrier landings. ●

Cdr. M. Nelson Piller, now Operations Officer of the USS HANCOCK, wrote this feature on braking techniques while flying lead desk in the carrier aircraft division of the Aviation Safety Center's Analysis and Research Department. A dyed in the wool single engine driver with over 300 jet carrier landings, Cdr. Piller was designated in 1942, saw wartime service instructing in operational training units for two years and then went to the WASP with VF-86, an F6F squadron. He is proudest of two events—his tour as Exec and Skipper with Cougar flying VF-112, which under his leadership was the first to win the Fleet Air Gunnery banner, and an exchange tour as naval liaison officer at the Directorate of Flight Safety Research, where it is rumored that his tail-hook tales sparked wide USAF adoption of hooks for its land based high performance fighters.

RUB-A-DUB-DUB

THE two men in this tub really had no intention of putting out to sea but the fuel ran low and would not flow, sooo . . .

When their aircraft had been set safely upon the water, the rear seated aviator calmly climbed clear of the cockpit of the torn-28 and stood soggily on the starboard wing while waiting for the other weary warrior to wander away as well.

Up front in the darkness the forward flyer was found fumbling with a fouled chute which was still stuck in a series of snarled straps surrounding the seat. Finally, the pair swam smartly from the swirl of the swiftly sinking ship.

Next came the pressing problem of preparing the pararafts for pilot passengers. It seems, however, that our forward friend had lately lost his load, lock, stock and lanyard. So that left only one raft remaining to be readied by the rear seat rider.

This doughty dual driver was distressed at the dunkings he was dealt. "The raft package was removed with ease from the parachute seat and the parachute was discarded. Some difficulty was experienced in remaining afloat until the life vest was remembered. Upon inflation, however, this problem was solved."

Thus buoyed up, he turned his total talents to the task of tugging at the tenacious toggle tether. "The life raft packet was tackled after this only to find the lanyard hook to be attached to the packet cover forming a loop. This was pulled but to no avail. Finally, after becoming disgusted, the raft was

pulled from the case and the toggle on the bottle was actuated."

Right about now you might expect that our determined dual pilot would be allowed to reap the reward of his arduous rigging of *his* raft and ride awhile in style. But no, as he sought to slither astride the side to sit inside, he spied—it's occupied! "The raft inflated immediately and he (that other fellow) climbed aboard. I then climbed aboard on top of him."

The time was night, the sea was slight and outside air was 60° Fahrenheit. "Until this time the cold water had not been noticed but he (same guy) then remarked that he was shivering, actually shaking. The suggestion caused me to notice the temperature and sympathetic shivering commenced shortly thereafter."

No wonder, the clod was unshod! "Upon entering the inflated raft, it was noticed that he (who else) had no shoes on. These, he remarked, were weighing him down and consequently he had discarded them."

And on top of that, no hardhat: "At this time, his (you guessed it) helmet was seen floating some five or ten yards away approaching the raft. It was decided, if possible, to get it back, however, it passed about one foot from the stern of the raft and pickup was voted down."

It soon became clear why the so called one man raft is so called. "No difficulty was experienced by either pilot in entering the raft, though, with two persons aboard, the stern was under water slightly."

A pyrotechnic parley was planned by the pilots for the purpose of pointing out their pitiful plight to persons who were passing periodically by plane and patrol boat. "Just after becoming settled in the raft an aircraft was seen departing the airport and was identified as an F-27. A flare was lighted by the lieutenant as it passed over the raft. The airplane was seen to circle and return overhead with both landing lights showing. The lieutenant then thought he saw a boat putting out from shore. A second flare was lighted by the dual pilot. At the completion of the burning period, out of curiosity, the day end was ignited. True to fact, this day flare is no good at night thus it was discarded. Lights of a boat were seen to be bearing down on the raft. A third flare was ignited and acquisition by the rescue boat's light was believed accomplished."

Soon after the signal salvo was seen the soaked and shivering "sailors" were safe and secure on shore. "Once on board the rescue vessel, both pilots experienced violent shaking, most probably caused by the extreme cold. The pilots were then dispatched to the Coast Guard barracks where blankets and coffee were furnished."

Thus the ditching was done with derring-do but the planning and preparation for possible peculiar problems was patently perfunctory. "This narrative is a description of the accident as viewed by the rear seat pilot. At no time is it considered that either pilot exhibited any panic and no particular fear was experienced during the accident."

Rub a dub dub, two men in a tub,
They both put out to sea;
And it was most fortuitous
That there were just the two of us
Instead of the legendary three.

DETAILS, DETAILS

SMALL OVERLOOKED DETAILS HAVE A NASTY WAY OF BOOMERANGING.

"DURING the course of night qualification the carrier advised me that my transmitter was very weak, unreadable in fact, except on deck or in the groove. However I assured the 'tower' that my receiver was working perfectly so I was launched a second time. Then after two waveoffs I was bingoed to the beach.

"As I climbed the fuel gage read 1800 pounds and the Tacan locked on at 78 miles. Following this I was distracted by erratic fuel readings but assured myself that even at warning light level there was enough for the 55 miles yet to go. I reported 'feet dry' to the

carrier but got no contact then I shifted to the air station tower.

"During idle descent to the field I called the tower but heard no reply. Finally, as I approached the break over a lighted runway, the tower gave me a green light but carried on a conversation with the runway duty officer as to who and what type aircraft I was. Even as I broke (still with the green light) the tower gave me no information on traffic, wind, weather, or runway.

"The pattern was flown normally and, though lacking a green light upon turning final, I continued to a centerline touchdown at 122 knots.

"Just after I watched the 7000-foot-remaining marker go by, the tailhook, which in my preoccupation I had neglected to retract, caught the field emergency arresting gear cable lying across the runway. The speed of the aircraft and the fact that I picked up the gear going the wrong way, combined to overstress the aircraft and the hook was yanked bodily from the fuselage."

Considering that the aircraft landing roll was abruptly resisted by approximately 38 tons of anchor chain it is no wonder that something gave way. Structural damage in the region of the viscera was classified as "substantial."

The hook was yanked bodily from the A4D

The accident developed from a very improbable set of circumstances. A fiction writer would in fact, have had to strain his imagination to weave in so many small details in such a tangled sequence as to wind up with the true-life ending. If any single item, anywhere along the trail had not occurred as it did the result would have been just another routine diversion to the beach with the transmitter repaired, the aircraft refueled and flown back to the carrier.

The weak transmitter: If good two-way communication was an absolute SOP requirement for carqual, the aircraft would not have been launched after the first trap landing. This is a real tough decision for a pilot to make on his own. Qual time is valuable, and poor communications, which he lives with frequently, seldom causes trouble. Without access to a crystal ball the normal impulse would be to keep trying to get qualified.

The tower's failure to broadcast landing info: Another pilot in the vicinity was aware of the A4D's plight and advised approach control to be alert for an inbound with no radio. The field was also notified by the ship that an aircraft without radio was being diverted. Had these reports specified "no transmitter" the tower would certainly have passed landing information; this is a standard routine whenever an aircraft enters the pattern without previous voice contact. However an assumption was made that "no radio" meant no receiver as well as no transmitter so, why clutter the circuit when he can't hear anyway?

Though the air station was designated the divert field, the facilities available had not been covered in the pre-launch briefing. Thus the combination of a strange field and no communications may have had an effect on the next item.

Failure to raise the tailhook: The obvious cure for this was use of the checklist before landing. This particular horse has been flogged so often and so heavily we can move onto the next stall. A runway duty officer was positioned near the landing area and he might have given a warning when he saw the illuminated approach light except for the fact that this was normal at the station. Carrier aircraft at the field used the approach light for a gear-down-and-locked indication by utilizing the tailhook override switch.

Earlier in the night, when the pilot was instructed to divert, the carrier gave him a bearing and distance to the field and he was also instructed to "clean up." However no specific mention was made of the tailhook and clean-up consisted only of raising gear and flaps.

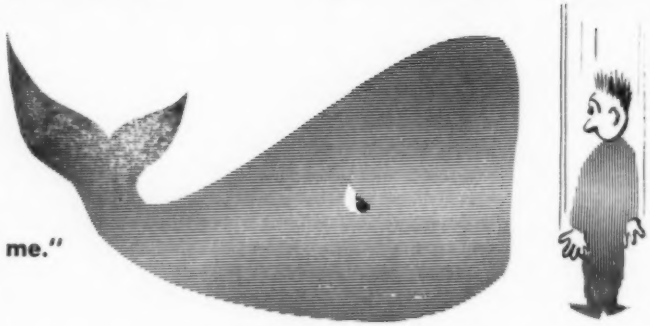
The unrigged cross-deck pendant: Tire sections were removed and the cable was flat on the runway but it remained connected to the arresting chain. This was considered to have been a strong contributing factor in the accident. In answer the station C.O. pointed out that his runways are very much wider than usual and the total weight of a cross-deck pendant is 850 pounds. The time involved in removal and reinstallation each time the wind changed would cause an unacceptable delay in flight operations.

Among the minor changes to operational procedures was one for a specific reminder to bingoed pilots to raise the tailhook when cleaning up. Station tower personnel have been instructed to pass landing information to all aircraft, even though it may be relatively certain that the receiver is out.

Why worry about details such as these when larger issues are pressing for solution? Like isolated cracks which may suddenly link up to shatter an ice floe into fragments, overlooked details and incorrect assumptions have a way of joining hands to block or delay the accomplishment of important endeavors.

SLIDE-OUT!

"I felt so helpless just hanging there and here comes the 'whale' turning in on me."



ON AN authorized low level run into target an F3D struck power lines with engine accessory damage and loss of fuel and hydraulic fluid. On climbing to altitude, the pilot was unable to lower his landing gear and decided to abandon the aircraft. Both he and the Airborne Electronics Operator made successful bailouts. Here are excerpts from their narratives:

AEO: I released my lap belt and shoulder harness and put them out of the way so that I wouldn't become entangled in them on my escape. I vaguely recall doing something to the IFF but cannot definitely recall if I put it into the emergency position or not. I then disconnected all of my headset and oxygen lines and tightened my harness and put my visor down. The pilot also disconnected in preparation for escape.

Reaching down, I pulled the helmet bags, the navigation packet and knee boards away from the escape door and put them in my foot wells out of the way. I placed my left hand on the lower escape door emergency handle, looked down towards the escape hatch and pulled the handle. As the doors blew open, I saw lines and something like a regulator blow away with the aft door.

As I looked at the pilot, he gave me a thumbs-up towards the escape tunnel. I took this as the GO signal. Lifting my legs up and around towards the tunnel was extremely difficult. Finally, I reached up to the overhead bar and pulled myself up and around. As I went into the tunnel, I took a last look at the instrument panel. The altitude was now about 7400 feet and the fuel quantity was down to 200 pounds.

I went into the tunnel and intentionally stopped there, looking down at the escape hatch to see if it was clear. Then I placed my right hand on the D-ring and left the aircraft feet first. I fell free and clear with no wind blast or tumbling. When I pulled the D-ring I was in somewhat of a head-down position. I had to pull the D-ring two or three times to actuate it because I pulled the D-ring upwards and to the right instead of across the chest.

I felt something like little fingers running over my back and thought this was probably the shroud-lines pulling out of my back pack. The opening shock was moderate. I experienced no pain or difficulty but felt rather uncomfortable with the pressure of straps on my groin. I looked up and saw a full canopy. I looked toward the aircraft and, seeing no other parachute, I became alarmed for the lieutenant's safety. I then saw him exit from the bottom of the fuselage and fall approximately 200 feet before he deployed his parachute.

I was still feeling uncomfortable because of the weight and pressure of the straps on my groin. Using the prescribed method of hooking the thumbs into the sling and kicking upwards to slide back into the sling, I tried three or four times to sit back in the sling. I couldn't. I just gave up, deciding to just hang there, glad I at least had a canopy over me.

I looked out towards the aircraft and saw that

it was starting a slow starboard orbit at my altitude. It was coming towards me—a horrible, terrifying experience. I felt so helpless just hanging there and here comes the "whale" turning in on me. It kept on turning and headed towards the lieutenant.

I was having great difficulty breathing with my oxygen mask on because of the valve on the bottom of the hose, so I released my left Hardman fitting.

● *The valve referred to is the check valve in the MC-3A connector. This valve has a two-fold purpose: to prevent loss of bail-out oxygen through the MC-3A connector when disconnected (as in bailout), and to give a positive resistance to inhalation thereby alerting the user when the connector has become inadvertently disconnected in flight. Actuation of the bailout oxygen is advisable at low altitudes to preclude the discomfort of this positive resistance during parachute descent if the mask is retained. If the Hardman suspension assembly is used without the chin strap reinstalled, then discarding the mask will probably, as the AEO points out as he continues his story, result in loss of the helmet during bailout. Installation of both the Hardman kit and the chinstrap is the only assurance that the helmet will be retained under these conditions.*

I realized that releasing my Hardman fitting was a ridiculous thing to do as the oxygen mask was the only way to retain my hardhat. I didn't want to lose my helmet and sustain head injuries so I re-hooked my Hardman fitting and cocked the oxygen mask up on the point of my chin which let me breathe around the gap between chin and mask.

Again I saw the F3D starting into another turn towards me. I was completely fascinated at the plane still flying around but became terrified again as it started another run into me. I believe that throughout the entire emergency, the plane coming at me upset me more than anything else. Again it turned away from me and headed once again for the lieutenant. I noticed at this time that the gear was still in UP.

I saw the ground coming up at me so I retracted both legs into a relaxed position and then hit. I hit on the left leg and was flipped onto my back and dragged through the sagebrush. I reached down and loosened my leg straps then my chest strap, lifting my arms up and over my head. The chute slipped off and pulled my helmet and mask off at the same time. I kept thinking about the F3D still in the air and was worried that it might crash into me so I jumped up quickly and then saw a large cloud of sand and dust about ½ to ¾ of a mile from my position.

After releasing my harness and establishing the position of the crash, I collapsed the chute. I pulled out the chute packer's card, released my PK-2 and pulled out the PRC-17. I pulled the antenna up to its full length, then realized that I didn't really know what I was doing, so I sat down to read the directions. I tried several times to transmit to the tower or the F3Ds on the taxiway that I was okay. I didn't get any reply or hear anything so I threw it down.

● *It was later established that the AEO failed to press the "receive" button.*

I pulled out my signal flares and lit one and stood there like the Statue of Liberty until it went out. I lit the second one and threw it down on the ground to signal the approaching crash crew. I then sat down, lit a cigaret and waited.

PILOT: I was setting up for runway 25 and I had to decide whether or not to shoot the approach. I tried lowering the gear again including rocking the wings, with no success. Rather than land the damaged aircraft without gear I decided to abandon the aircraft. I motioned to the AEO to pull the emergency escape hatch which he did. I devoted my attention to heading the aircraft toward the sands while he prepared to bail out. When I saw him start down the hatch, I checked airspeed at 120 knots and trimmed for slight nose-up attitude. I saw that the AEO was still in the hatch so I unstrapped and prepared for bailout. I switched IFF to emergency and checked the trim once more.

Positioning myself in the hatch, I put my hand on the D-ring and slid out. I pulled the D-ring twice; the chute opened with only moderate shock. I looked up to make sure the canopy was open. It looked okay. The plane was heading for the sands like I thought it would with the right wing slightly down. I watched the right wing drop and couldn't believe it would start back toward us. I thought it was coming right for me so I tried to slip the chute by pulling on the front risers. I saw it was going to miss me and I watched it go around again. The second time around it didn't come close to me and I watched it crash.

I then started looking for where I was going to land. Very shortly afterwards I hit the deck with a pretty hard jolt. I realized I was okay so I collapsed the parachute by walking up the risers. I unstrapped, gathered up the chute and set the seat pack on top of it. I had attempted to remove my helmet previously by pulling it over my face so at this point I removed it by releasing one of the Hardman fittings. With the helmet in my hand, I started looking for the AEO. After awhile I saw his flare. I saw him get into a pickup truck so I started walking so as to intercept them. They saw me and picked me up . . . " ●

IN THE BLIND

"FIVE of us were scheduled to fly F4Ds from the carrier to the Naval Air Station. At 1100, we were in the readyroom briefing for the flight. Shortly before we manned aircraft, the ship's aerologist called and advised us of weather conditions and sea water temperature along our proposed route. We ate lunch, then re-briefed at about 1145.

"We were to rendezvous on the 315-degree radial of the ship's Tacan at 15,000 feet, 20 miles from the ship. I was the fifth F4D catapulted. Everything was normal. I climbed through a broken layer of clouds and proceeded to the rendezvous point.

"Proceeding on course, at 18,000 feet, indicating 280 knots, we began to perform IFF checks with the ship. My IFF check complete, I maintained a comfortable wing position on the leader while waiting for LT —— to move into number two position, but he was nowhere in sight."

During the interviews before the Board it was determined that the briefing did not include procedures for rendezvous or repositioning. Further questioning revealed a lack of understanding on the part of each pilot as to standard rendezvous and repositioning procedures. Also, no signals or voice transmissions were used to indicate repositioning.—AAR

"Then something in the right rear view mirror attracted my attention. I saw the underside of an F4D-1 appearing as a plane does coming across the ramp for landing. As I recognized that it was an aircraft, there was the first impact of collision." (One aircraft with most of the wing missing was observed going down. The second aircraft was not seen after the collision. The narrator of this story ejected successfully; the second pilot was never found.)

"The first impact was followed immediately by banging and bumping on my aircraft. My nose

kept coming up and there was a buffet accompanied by a tremendous tearing sound. The nose rotated straight down to the left. I thought I heard someone yell 'Eject' over the radio. This was followed by the flight leader saying 'MAYDAY, MAYDAY, MAYDAY, mid-air collision.' This was the last thing I heard over the radio.

"At this time I was in a violent spin to the left. The G-forces were so great that I was unable to raise my hands at all. (I was wearing a cutaway anti-G suit.) I gave up momentarily and wondered what it was going to be like to hit the water. My head was plastered down on my chest. I felt that I could not reach the curtain with my head so far down. My shoulder harness was locked.

"I was able to claw up my clothing and get hold of the oxygen mask. Finally I got the helmet off by holding the mask and getting out from under the helmet rather than taking it off the normal way. All this time this tremendous G-load was still on me.

"Once the helmet was off, I thought 'spin recovery.' I got hold of the stick and moved it to the right. Then the aircraft felt like it came out of the spin, went over the top and started an inverted spin. Just then I heard tearing and got a glimpse of the canopy leaving the aircraft. At this time the tremendous G-load was not present. When the canopy left, I thought of the curtain flapping in the wind. I reached for it and nicked it the first time but got hold of it with my right hand the second time. As I pulled I threw my head back.

"There was the explosion but no sensation of a kick in the pants. After leaving the aircraft, my first realization was that my feet were flailing and that I had not put them in the stirrups. The face curtain was pressed tightly against my face. There was a tearing and ripping sensation around my waist and the seat separated from me, going to my rear and the right.

"My first thought was that my parachute had been torn off. I was tumbling violently and went into a ball to protect myself from the wind. The wind was horrible . . . it sounded like a rocket in my ears. I reached back with my right hand and felt the parachute. At this time I straightened out to stop the tumbling and reached for the D-ring. My tumbling had slowed; I was going through some gyration, but it was not violent. When grabbing the D-ring, I got a glimpse of white and dark and thought that must be the clouds which I remembered at about 5000 feet. I was going to pull the ring when I realized that I was going like a bomb. I was very conscious of decelerating at this time. The deceleration was so evident I decided to wait until a constant pitch was reached before pulling the ring.

"I knew the automatic parachute should work. I was in a crouched position when I saw the streamer go out between my legs. When the parachute opened, I was flipped over violently. This was followed by a slight tug. I was then in the parachute descending. During the free fall there was no sensation of falling, only one of tremendous speed.

"At this time I was completely blind, I could

see nothing at all. Even when I put my hands right up to my face I could not see them. I was concerned about the water landing and being unable to see. I tried several times, maybe 10, to get back into the sling but was unable to do so. I was completely exhausted.

"I decided that since I couldn't get back into the sling I should make every preparation to get clear of the parachute after hitting the water. I could not reach the snap to undo the raft from the pararaft container so I unhooked the yellow lanyard from my mae west. I held it in my hand, then in my teeth as I tried to think and attempted to see something.

"I was finally able to make out my legs and dark and light below me so I figured that I was above the clouds. I still had my knee board on my right leg and my oxygen mask attached to my parachute chest 'V' ring. I loosened these and held them in my hands to use as altitude markers. I unhooked my chest snap—there was no difficulty in doing this as there was no great amount of tension on it. I was holding my arms across my chest. I dropped my knee board but could not see to follow it. Shortly afterward, I dropped my mask as I was too tired to hold it.

"My plan was to get free of the parachute as soon as I hit the water so that I wouldn't be dragged. I wanted the raft but I was willing to sacrifice it to keep from being dragged through the water by the parachute. I decided to keep my shoes on when in the water because I had read that persons wearing shoes were very rarely bitten by fish.

"I do not remember going through the clouds. When everything below me became dark, I figured that I was below the clouds and approaching the water. I was comfortable in the parachute and there was no tendency to fall out even after the chest strap was undone. I even thought of attempting one more time to get back in the sling but decided not to as I thought I might dump myself out of the parachute.

"All this time during the descent I could hear an F4D circling me and figured that he had me in sight.

"I checked the snaps on my leg straps and they were easily reached. I kept trying to think what might foul me after I hit the water. All I could think of was the life raft lanyard; I dropped it and felt to make sure that it was clear. I then just waited to hit the water. All this time I couldn't see much, but I could distinguish light from dark.

"I stayed in the parachute with my fingers on the leg snaps. Becoming aware of motion, I drew my legs up slightly. I hit the water going to my left and slightly to the rear. My feet hit and I was in the water. I didn't go far under the surface and came right back up. My right leg strap was free, but the left one was still hooked up and I was being dragged. I reached down and unhooked the left snap. The strap was fouled on my leg. As I moved to free it, it moved slowly from my leg. I realized that I was not being dragged too fast so I turned and grabbed the seat pack and held on.

"I saw the parachute half-billowed. I did not try to spill it since I could keep my head out of the water even though I was going through the water. I finally came to a stop and went to inflate the raft. I tried pulling the yellow lanyard, then remembered that the lanyard leads you to the toggle and is not itself the thing that inflates the raft. I then felt a shroudline on my left leg. This startled me since I had heard of people becoming completely entangled in them. I popped my left vest and was holding the yellow lanyard in my left hand. I then freed the shroud line from my leg and got hold of the pararaft inflation toggle. I still could see almost nothing and was doing everything by feel. I pulled the toggle and the raft inflated. As it flipped over, I saw the sea anchor was in it and the parachute and survival gear were attached to the raft. I decided the parachute would be a good marker from the air and left it attached to the raft.

"I got hold of the raft, took a few breaths and got in it with no difficulty. Once in the raft I just lay there. I could hear an F4D circling me and gave him a 'thumbs-up.' I took off my gloves since they were slick from being wet and put them in my pocket to save them if I were out overnight. I got the survival pack in the raft with me, then tried to loosen the parachute in case it might drag the raft down. I could not make any headway with the knot so I loosened my knife to cut the line if necessary. My knife was very easily reached on my left side.

"I thought of putting the sea anchor out since I was getting an upset stomach. I did not put it out because I did not want to risk falling out of the raft while getting it from under me. I knew the parachute was also acting as a sea anchor.

"I then took an inventory and saw that I was all in one piece. My eyes were extremely swollen and when I reached up to my face my eyes were sticking way out; they were the first things that I touched.

"My ankles were cut and bleeding. I put my feet on the gunwales so that the blood would not be in the water and attract fish. I also decided that if I got sick to get sick in the raft so it wouldn't attract fish.

"I looked for the sun to get my bearings. I figured that it was in the southwest and saw

that it was high in the sky. I turned the raft to look east to see if the ships were in sight but saw nothing. I did not feel sick when facing into the wind and sea. It was too much effort to paddle and stay into the wind so I let the raft drift. (I threw up three or four times shortly after this in the raft. Afterwards I was quite comfortable.) I became aware of a prop plane circling and looked up and saw a TF going around me. I waved to him. I used no signal devices since I wanted to save everything until someone who could assist me arrived on the scene."

The pilot's actions following the collision indicate a sound knowledge of ejection and survival procedures, especially considering his temporary loss of vision. However, his concern over conserving the signaling equipment made the airborne search more difficult and could have delayed his rescue.

—AAR

"Several times the TF got completely out of sight and sound. I figured that they had lost me. This did not bother me as I knew the ship had a fix on my position. The TF would finally return and circle again. I just waited for help to arrive and hoped it would be a boat as I was completely exhausted."

It wasn't until about the third orbit that we were able to actually see the pilot. By then the canopy had sunk but the pilot had gotten into his life raft and we could see that he had put out a sea anchor. We orbited this position, relayed information back and on one pass could see the pilot waving so he appeared to be in pretty good shape.

The only comment on this is that it was very difficult to maintain visual contact with the pilot in the raft at times when we were not directly over him. I felt that if it had not been for the bearing off the oil slick it would have been damned hard to maintain position in his immediate vicinity. At any rate the information was relayed back, the helicopter came out at which point the pilot ignited a red smoke signal which was very satisfactory and he was recovered immediately.

—TF Pilot

"After awhile I heard another plane and saw an AD approaching from the east," the survivor continues. "He turned before seeing me and was searching in the south. I knew that he could drop a big raft, but I did not signal since I was OK in my raft. I then saw a helo. He was headed toward me but turned before he reached me. He was searching the same area as the AD.

"I then lit a smoke flare from my mae west. The helo saw the smoke and headed for it. He reached the smoke, then came straight upwind and saw me. I was saving the flare for the night but threw it away when I saw the helicopter rescue seat lowered into the water. I got into the water as the helo got over me and held the raft. I reached for the rescue seat but it jumped out of the water and landed on the far side of the raft. I made no attempt to get it but just held the raft. The seat lifted out of the water and landed beside me. I grabbed it and got it underwater and got on. I was no sooner on than I was out of the water.

"I was up in the helo and the crewman was trying to pull me aft. I would not let go of the rescue seat since I did not want to fall out of the helo. The pilot indicated that I should lift my feet, which I did, and the door closed below me. I was then dropped to the deck of the helo and crawled aft. I was unable to talk but kept giving them thumbs up to say that I was OK."

The reporting flight surgeon makes the following comments:

"The pilot was well-prepared, by training, for this ejection. In addition to 'routine' training procedures, he had read and digested articles on survival from many available sources. He has a professional approach to these matters. This attitude and training account for the smoothness of his ejection in an extremely difficult situation. Indeed, a less well-informed and professionally motivated pilot might not have survived this accident at all. Throughout the ejection procedures, items in his training and reading flashed to his awareness. This permitted orderly and 'automatic' decisions and reactions without delay or quandary. Frequently some of our people become bored with repetition regarding survival and personal equipment training. All one needs to appreciate the absolute necessity of frequent repetition of such training is to talk with someone like this pilot who narrowly escaped and who now has repeatedly stressed the need for this training with repetition until it becomes almost an automatic reaction."

Within the 13-month period preceding the accident, the pilot had had the following survival training: 1) F4D ejection seat lecture and dry run; 2) parachute harness drill in which he jumped off the stand to get suspended in the harness in order to practice getting seated back into the harness and releasing the straps; and 3) poopy suit swim in the ocean off Virginia Beach and a helicopter pick-up from the water by means of the sling.

In the last five years, he had practiced getting into the life raft from the water five or six times. During the week preceding the accident, he had attended a lecture by the squadron safety officer from which he remembered items during his ejection-descent sequence.

A Dangerous Place

THE flight deck is a dangerous place. Men who work past their limit of effective endurance jeopardize their safety and the safety of others.

The 19-year-old plane handler had been up for 21 hours and at flight quarters 16½ hours with only an occasional break for chow or a cigaret when the accident happened. He was working as the starboard chock man for an F3H being brought up from the hangar deck to the flight deck on the No. 2 elevator. Instructed to pull and walk the chock as the tractor towed the aircraft, he walked in front of the wing and inboard of the wheel rather than outboard of the wing and wheel. As the aircraft accelerated, he turned around, looked at it, crouched and ran forward as the wing caught up with him. The starboard wheel ran over his right ankle causing a compound fracture.

The injured man later stated that he was tired, that it had been an effort to even pull the chock and that his mind had been working slowly at the time of the accident.

The human cannot maintain peak efficiency and effectiveness without sleep, the reporting flight surgeon states. He recommends that when operations are to extend so that the men are awake for 18 hours or more, crews should be rotated to afford them the chance to sleep.

notes from your FLIGHT SURGEON

Protection

BOTH the pilot and copilot of the HRS-3 received strained neck muscles from considerable "flailing and vibration" of the aircraft when the rotor blades struck the water. Both were wearing APH-5 helmets which absorbed a considerable amount of force, striking several objects in the cockpit. Undoubtedly both men would have been injured severely if they had not had the protection offered by their helmets.—*From an MOR*

Low, Slow and to the Left Of Center

DURING carquals, an F8U-1 swerved off the flight deck after a normal arrestment on the No. 4 wire and dropped into the port catwalk. The plane rolled over on its side and hung on the side of the ship.

The aircraft was secured with extra wires and a lifeline was thrown to the pilot. After some difficulty in removing himself from the cockpit at this 90-degree angle, he crawled out and back aboard the flight deck. Among his first remarks was the statement that the LSO had made no transmissions to him during the approach. This, of course, was not the case.

The reporting flight surgeon describes this situation as an instance of fascination.

"It appears that the pilot was concentrating on visual stimuli to the exclusion of all others," the AAR states. "He was watching the meatball and remembers nothing else. . . . He honestly 'heard' no radio signals during the approach and complained about this first after the accident. Since his radio gear was known to function after and just before the accident, we must assume a 'fascination' with visual stimuli which were occupying his full attention. He only became aware of his left line-up and his angle-of-attack immediately before ramp contact. Presumably, he occupied himself with these problems to the exclusion of auditory stimuli received at the same time."

Other elements entering into the accident were the limited roll out area and the absence of the number one wire.

Built-In Accident

DURING the landing phase of his flight, the pilot of an attack bomber inadvertently retracted the landing gear on the runway and caused considerable damage to his aircraft. The reporting flight surgeon makes the following comments on this accident:

"The most important fact brought out in this investigation is that an experienced aviator (in this case with 500 hours in type) operates many of the controls in his aircraft at a preconscious level. Certain actions are automatic and must be carried out without constant monitoring of the conscious cortex. This man has always retracted his flaps immediately after touchdown to insure weight on his wheels for braking action. Without actually thinking the action out, his hand automatically pulls off power, drops 12 inches and actuates the flap lever. During the run out his peripheral vision picks up a vague signal from the center console that the handle is still down. Peripheral vision is notoriously poor in visual acuity and it mistakes the gear handle for the flap handle. A subconscious short circuit occurs, and without voluntary control, his hand strikes the gear lever, thinking it to be the flap lever.

"This type of a short circuit is not unique in aviation. It is only more costly. Prevention of accidents of this nature comes under the realm of human engineering. This accident was built into the airplane. Two controls with such different effect on the airplane should not be so close together. Furthermore, a different type maneuver should be necessary to actuate each lever. The placing of two levers, side-by-side, that can be actuated by the same motion and yet have different purposes, is contrary to the concepts of human engineering."

Why do we keep accepting troublesome designs?—Ed.

Ring Around the Flight Line

EVERY year we see two or three people with deep cuts in the ring finger or amputations of the ring finger from tears caused by the wedding bands, class rings. . . . No matter what your job may be, rings are dangerous because there are too many projections you can catch them on. If you stop a minute, I'm sure you can think of someone to whom this has happened.

We often hear the story, this won't happen to me 'cause I wear gloves. Don't kid yourself, there are a lot of times the gloves come off because you can't do a certain job. The potential is always there and it only takes a minute in jumping from a truck or aircraft to catch that little piece of metal on something and then you've had it.

Let's set a policy of no rings on the flight line.—*"USAF Airscoop"*

Section 13103 of U. S. Navy Safety Precautions (OpNav 34P1) prohibits the wearing of loose, flowing or torn clothing, gloves, neckties, long sleeves, and rings *or bracelets around machinery. Section 02302(7) of the manual cautions against the wearing of finger rings by personnel handling stores. —Ed.*

It is prophesied that this accident did not involve the last Navy aircraft which will inadvertently go into afterburner . . .

RUNAWAY!

THE night check crew was correcting a discrepancy to the engine igniter circuit of an F4D. An airman tried to start the engine. The intent was merely to obtain a start and allow the engine to accelerate to idle power. The airplane was chocked on the line without tiedowns.

The first start attempt was unsuccessful and resulted in a wet start. The engine was given a dry run and after 15 or 20 minutes a second start attempt was successful. During the start, excess fuel drained from the tailpipe and ignited. The airman, thinking the airplane's tail was on fire, advanced the throttle in an attempt to blow out the fire. The airplane skidded along in the chocks for about five feet, then jumped the chocks with the starter unit still connected and traveled in a slight arcing path for 210 feet before striking the corner of a hangar curtain wall and hangar door (see photo). The airplane came to rest against the hangar with the engine still running. Upon impact the airman was partially thrown from the cockpit and received a cut across the bridge of his nose. He evacuated the cockpit with the engine still running in the belief that one of the ground crew had been dragged along with the starting unit. He then returned to the cockpit and, since he could not retard the throttle, stopped the engine by means of the engine master switch. Fire trucks and crash trucks arrived on the scene almost immediately. Fortunately, no fire resulted from the crash.

Instructions pertaining to the starting of aircraft were reviewed by the accident board. OpNav Inst 3710.7A, General Flight and Operating Instructions for Naval Aircraft, states, "When an engine is started by non-pilot personnel for testing or warm-up purposes on aircraft other than VR and VP class multi-engine aircraft equipped with parking brakes, the plane shall be tied down." Local instructions stated, "Aircraft to be turned up by plane captains or other maintenance personnel will be chocked at BOTH main landing gear wheels and have adequate tail or main landing gear holdback lines." Both the chief petty officer in charge of the night check crew and the first class petty officer in charge of the turnup were acquainted with the requirements contained in the instruction. As previously stated, the turnup

It is prophesied that this accident did not involve the last Navy aircraft which will inadvertently go into afterburner . . .

crew had intended to start the engine and allow it to accelerate no higher than idle RPM. Therefore, the turnup was made on the line with chocks on both wheels but *without* holdback lines.

Prior to the accident, troubleshooting by the electrical crew indicated that the engine ignition difficulties were caused by the left igniter. The airplane was towed to the line where the electricians attempted to determine proper functioning of the igniter by listening for its sound when it was energized. Another aircraft turning up nearby precluded a check by this means. The electricians then requested the power plant crew leader to start the engine for a check of the ignition system. The power plant crew leader designated the mechanic involved, the only F4D qualified man in the night check crew, to start the engine.

Lighting was poor in the vicinity of the airplane. It was about 2010 on a dark night. It had rained previously and the cement apron was still damp with occasional puddles of water. An NC-5 had been parked on the starboard side of the plane forward of the wing with its headlights aimed at the starting air connection on the plane. The outside hangar lights were one. Flashlights were the only other source of lighting.

The normal procedure prescribed verbally by the line officer for wet starts is to swab out the tailpipe, dry run the engine, call the station crash crew to wash down the apron under the aircraft and wait 15 or 20 minutes. If fuel still remains in the vicinity the aircraft is to be moved before attempting another start. The regular line crew have been observed to follow this procedure religiously.

Following the wet start on this F4D the engine was given a dry run and a waiting period of approximately 15 to 25 minutes. Members of the starting crew said that "someone" inspected the tailpipe with a flashlight but it could not be ascertained just who this was. The area under the plane was not washed down and the airplane was not moved prior to the next attempted start. A CO_2 fire-bottle was manned for the next start. Prior to this start the right igniter was hooked up and the start was attempted on both igniters.

The power plants crew leader had controlled the first start but, although at the scene, did not initiate or control the second start. He did not notice any fuel dripping from the aft section of the airplane or the tailpipe before this lightoff. On lightoff a large amount of fuel blew out of the tailpipe and onto the ground. This was almost immediately ignited by the severely torching engine. The man in the cockpit noted this immediately and signaled the starting crew to disconnect the air starter. One electrician jumped on the NC-5 and moved it clear while the other electrician attempted to disconnect the air start unit. He was forced to back away prior to disconnecting the air starter by the rapid acceleration of the engine. The man with the fire bottle stated he had

no opportunity to use the bottle before the plane went into afterburner and forced him away. The man in the cockpit received no orders or signals from the ground crewmen. The power plants crew leader removed the ladder from the cockpit when the man in the cockpit signaled to disconnect the air starter. The plane then jumped the chocks and hit the hangar.

The analysis of this accident is presented under four categories.

A. The board is of the opinion that the airman was qualified to perform an engine start of an F4D-1 airplane. He has the technical qualifications of a third class aviation machinists mate and had actually been recommended for advancement to second class prior to non-related disciplinary problems. He had attended the contractor's school for line maintenance of the F8U-1 airplane which is also equipped with the J-57 engine. He had started and turned up J-57 equipped airplanes on numerous occasions.

In answer to the question as to whether an emergency situation existed, the board believes that there was no emergency nor cause for any corrective action on the airman's part. As two witnesses stated, the fire on the ramp went out prior to the time the aircraft left the chocks. Even with a persistent fire, his action in advancing the throttle would not have been correct. Blowing out a fire around the tailpipe by advancing throttle in a jet airplane appears to be a "not-infrequent," however erroneous, procedure. It may be a carry-over from certain propeller airplanes, whose handbooks recommend this procedure for a fire on starting.

Emergency drills and procedures for turbojet fires *must* emphasize that opening the throttle supplies more fuel for the fire. Since the air starter unit was still attached to the aircraft, a tailpipe fire could have been handled by placing the throttle in OFF and rotating the engine with the starter unit. A fire outside the tailpipe or on the ramp will normally be handled most safely by placing the throttle OFF, using a fire extinguisher and, if possible, towing the aircraft from the vicinity. The board opined that while advancing the throttle and looking toward the tail of the airplane, the airman inadvertently and unknowingly placed the throttle in the afterburner detent. If he were in a position on the right side of the cockpit looking aft, the force exerted on the throttle would have a left or outboard component. When advanced on the quadrant to the position of the detent, the throttle would go outboard and select afterburner. Not realizing that the throttle was in afterburner, the airman was unable to move the throttle to IDLE because it was in DETENT.

B. The direct cause of the accident was the fact that the aircraft was not tied down for the turnup. Had the start and runup been only to IDLE RPM as planned, there would have been no accident. If the airplane had been properly tied down, as required by OpNav Inst 3710.7A and local instructions, there would not have been an accident even though the plane captain increased RPM above IDLE and inadvertently went into the afterburner detent.

Responsibility for not tying the aircraft down prior to starting the engine is deemed to rest primarily with the power plant crew leader, who was at the scene, and secondarily with the crewman turning up the plane. Partial responsibility, however, is deemed to rest also on the night crew chief for not requiring strict compliance with the OpNav and local instructions on all starts.

Technically, the intention to accelerate only to IDLE RPM does not obviate the requirements of the instructions. It should be noted, however, that naval aviation units as a whole have been observed not to comply strictly with these regulations. Enforcement of this instruction requires constant attention on the part of maintenance supervisors. Turbojet engines have not indicated the same frequency of "running away" as their propeller predecessors and a greater degree of laxness is sometimes apparent in tying them down for simple lightoffs. It must be continually emphasized to all maintenance and pilot personnel that the possibility does still exist and that the additional time and effort required to properly tie down the airplane must be taken.

Other factors contributing to the incidents leading up to the accident involve the presence of the fuel on the ramp aft of the tailpipe. The fuel which ignited from the torching engine was observed by several witnesses to blow out of the tailpipe just prior to the lightoff. The board believes that the presence of this fuel is attributable to either the previous wet start or the electrical troubleshooting and testing procedures or both.

The board feels that even though it was reported that someone looked into the tailpipe following the wet start, that this inspection was not sufficiently thorough, particularly in lieu of the poor lighting in the area. Had this inspection been more thorough and had the tailpipe been properly swabbed out, the probability of the ramp fire and the torching would have been less. In particular, the senior men present at the turnup should have personally ascertained the condition of the tailpipe and the ramp before permitting a further attempt at starting. Positive leadership appears to have been lacking during the events leading up to the accident.

Although the board stated it is not technically

expert in electrical troubleshooting and testing procedures, it is of the opinion that the electrical crew should have waited until the aircraft nearby had completed its turnup. Then the listening method could have been used. Following the wet start, however, the electricians should have attempted to determine its cause prior to attempting another start. Instead, they merely determined that the engine control fuse had not blown and then reconnected the right igniter so as to start on both igniters. If the left igniter had malfunctioned as one would be led to believe by the wet start, the next start might be expected to be wet, delayed or at least result in torching.

C. There were no material failures or malfunctions which contributed to this ground accident. An extensive investigation was made on the possibility that the engine went into afterburner without the throttle being placed in the afterburner detent. The board is of the opinion that the airman inadvertently placed the throttle in the afterburner detent. This opinion is substantiated by several witnesses.

D. The board is of the opinion that adequate, though not ideal, facilities were available for safe start of the aircraft. Two factors probably influenced the personnel in using the operating line rather than the turnup area for the start. First, use of the turnup area would have required towing the aircraft approximately 300 feet. Therefore, tools and parts available in the shop area would not have been as accessible. Second, the turnup area does not have lighting facilities while the operating line is illuminated by outside hangar lights. The board believes that, if the pace of operations requires extensive night maintenance and engine turnups, the requirement for lighting facilities in the turnup area should be investigated further.

The prompt action by the crash crew and fire department possibly prevented what could have been a disastrous fire.

The board made the following comments and recommendations:

A. All naval personnel and particularly those in supervisory positions must diligently observe and enforce directives of higher authority. The Navy-wide problem of prevention of accidents is of ever-increasing importance in view of the cost of present day aircraft. In the specific area of preventing ground accidents because of improper or inadequate tie-downs, the board recommends that all aircraft except those VR and VP type exempted by OpNav Inst 3710.7A be tied down adequately during starts by maintenance personnel to withstand the maximum thrust of the aircraft. The board confidently prophesies that this accident did not involve the last Navy aircraft which will inadvertently go into afterburner. Therefore, all aircraft being started by maintenance personnel must be tied down for this eventuality. However, no directive is any more effective than the degree to which it is observed and enforced by supervisory personnel. Herein lies the greatest area for solution of the ground accident problem.

B. That supervisory personnel thoroughly train themselves and those under their charge in the proper course of action to take in the event of occurrences and emergencies common to their type aircraft. The incidents preceding this accident were not unusual with turbojet airplanes. Either a more thorough inspection and cleanup following the wet start, or the correct action following the ramp fire would have prevented this accident.

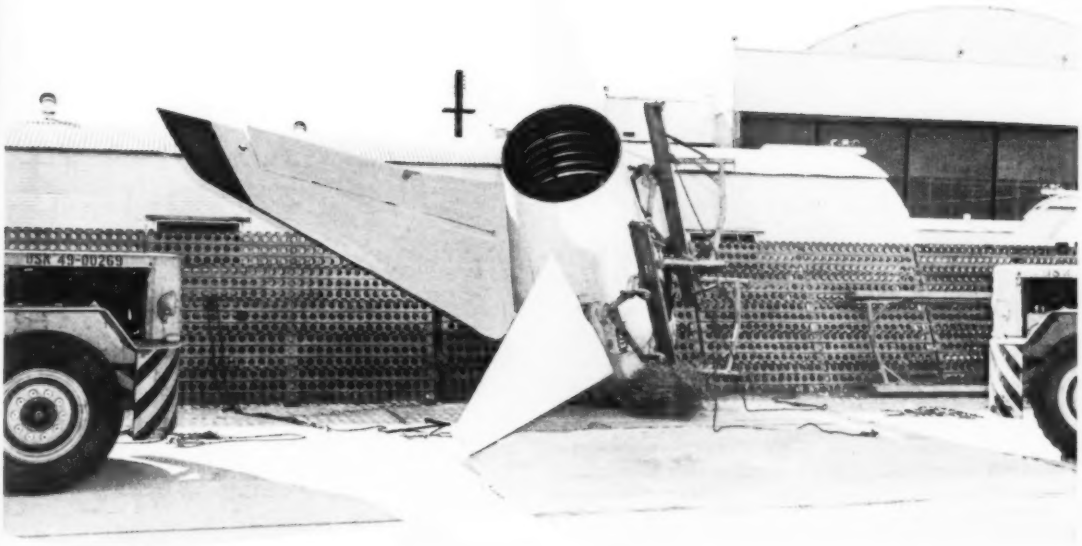
C. That maintenance troubleshooters be encouraged to follow a positive analytical troubleshooting procedure based upon sound maintenance practices rather than trial and error methods.

The board also recommended that the requirement for lighting facilities in the aircraft turnup area of this station be further investigated.

Ground Accident Threat

The fine line which separates aircraft accidents from Incidents, Flight Hazards, and Ground Accidents continues to threaten the safety records of all units. The aircraft accident rate of 2.2 for AirFMFPac as of the end of the first half of Fiscal Year 1960 is the lowest on record. This accident rate reflects only the aircraft accidents that have occurred during this period. However, a more complete picture of our safety program must include the "almost" accidents that are reported as Incidents and Flight Hazards and the aircraft damaged or lost in Ground Accidents. We have mentioned before that reports of these occurrences quite often highlight areas in squadron operations and maintenance procedures that need correction and/or closer supervision.

Use of a list of all the Incident, Flight Hazard and Ground Accidents that were reported in the first half of this Fiscal Year is recommended as an aid in prevention of accidents and near accidents. A few hours of "prevention" may save many hours of accident investigation!—*AirFMFPac, El Toro*



CAN YOU TOP THIS?

Many accidents are caused by an "improbable" chain of events touched off by an "improbable" set of hazards which all happen to be there at just the right moment. Here's a classic example:

This F8U tail section was:

(1) Not tied down because
(2) tie-down holes on the flight line recently had been cemented over.
(3) Not stowed in the hangar due to lack of space.
(4) Aerology did not forecast unusual wind conditions,
(5) did not disseminate warnings promptly when abrupt wind shift occurred.
(6) Wrong telephone numbers listed for the Wing Duty Officer.

To the latter the accident board added: "the 'probability' of proper warnings from that level (WDO) preventing subject damage is doubtful".

Fevven's sake!

DOWN but not LOCKED

During the next 12 months about 18 aircraft will fall to the deck "with bended knee" during maintenance. This prediction is based on the averages of the past 5-year period in which 87 accidents occurred due to the landing gear handle being left UP following a phase of maintenance.

The underlying reason for these accidents is that movement of landing gear handle is required to check the various aircraft systems with a variety of mechanics being involved at various times. Someone, somehow, somewhere along the maintenance procedural line will fail to return the landing gear handle to DOWN and when power is applied to the gear system without downlocks in place the inevitable will happen—KEERUNCH!—the landing gear will work just like it is supposed to. It retracts! Here's a detailed report involving just such a set of circumstances which is typical of the majority of the more recent accidents.

THIS F8U aircraft had undergone a major airframe check and an engine change. An airframe check crew had performed the operational check of the normal and emergency landing gear systems. During the cycling of the gear to purge the system of air, after the emergency gear extension, the hydraulic jenny failed. The jenny would be out of commission for at least one day, so the airframe crew put downlocks on the main gear,

The AIRFRAMES CREW

and removed the jacks. A downlock for the nose gear could not be found, therefore the nose gear was left on its jack. The power plants crew leader was informed of the missing nose gear downlock and told not to remove the jack.

The following day the nose strut was serviced, lifting the aircraft off the jack. The nose jack was removed without installing a downlock. The power plants crew leader had the aircraft towed out to the ramp for motorization and turnup. As the engine began to turn the nose gear retracted.

According to the Board it was not possible to determine who placed the gear handle UP. A safety downlock solenoid is installed on the gear handle to prevent moving the handle out of DOWN unless the weight is off the main gear and electrical power is supplied. This feature was checked after the accident and found to operate correctly.

the CHIEF

The airframes member who was in the cockpit and the Airframes Chief stated that the gear handle was DOWN when they left the aircraft on the nose jack.

An AM2, the airframe crew leader, knew there was not a nose downlock in place when he left the aircraft. He is a contributor towards this accident for not ensuring that a downlock was obtained and installed.

An AD1, the power plants crew leader, had been told the previous day that the aircraft did not have a nose gear downlock. He told an AD3 to ride the brakes while the aircraft was towed from the hangar to the ramp. The AD1 did not use a turnup check-off list during the motorizing as required by squadron directives. He is a contributor towards this accident for not ensuring downlocks were in place and that a check-off list was used prior to motorizing the engine.

The brake rider performed the cockpit procedures for starting on the ramp. Since it was not possible to raise the gear handle without electrical power, it is most probable that the gear handle was UP when he got into the cockpit. It was a matter of chance that the nose did not collapse during the trip to the ramp. When the aircraft was on the ramp the brake rider stated he checked the cockpit switches for proper position but did not check the gear handle position. When electrical power was connected he stated he saw the gear indicate DOWN. This is highly unlikely the Board said, because with the gear handle UP and the gear DOWN, the main gear indicators will show DOWN and the nose gear will have a BARBER POLE indication. There is a red light in the gear handle which will glow when the handle is out of phase with the gear. In this instance the gear handle light was OUT. However, because of the close proximity of several other brighter red warning lights that were ON, it would have been relatively easy to overlook. As the engine was motorized the utility hydraulic pressure built up, retracting the nose gear. After the nose hit the deck the brake rider got out of the cockpit. Later he and another man checked the gear handle and found it UP. He then placed the gear handle DOWN. The brake rider is the primary contributor to this accident for not ensuring the gear handle was DOWN when he climbed into the cockpit.

It is recommended that all personnel involved in moving aircraft be reindoctrinated in the responsibility for ensuring downlocks in place and the cockpit switches properly set—particularly the gear, wingfold and incidence handles.

and the POWER PLANTS MECH contributed...

...but the BRAKE RIDER got the blame!

Gear DOWN and LOCKED?

In-flight "Fail-Safe" designs require moving of the landing gear handle UP during maintenance to check various systems. The high number of mech-induced gear-collapsed accidents indicates a need for a "fail-safe" device now for the mechanics. Here it is in the form of a checklist.

Fuel Handling Procedures

BUWEPS Message quoted in part—"Fuel Handling Procedures. Within last two weeks one R6D fueled JP-5 vice avgas. R6D error discovered prior to takeoff and disaster averted. Occurrence of this type serious error can be prevented only through continued command attention and positive supervision of fuel handling procedures in addition to normal preflight inspections. The related threat of fuel contamination through lax fuel handling methods increases the potential of aircraft accidents from this support cause. Commanding officers are requested to address this matter to those personnel responsible for all stages of fuel handling and to review existing fuel handling procedures and supervision with an eye toward insuring positive control performance . . . "

Headlights

DURING a pre-dawn launch violent rocking of the HSS was experienced on rotor engagement. Aircraft was immediately shut down and one rotor blade was discovered to have rotated and been bent 90° at a position near the hub thus causing further damage as it struck another blade. This was a result of the horn locking pin being left OUT and safetied OUT.

Two crewmen and both pilots failed to discover the discrepancy on preflight inspection. Lack of flashlights was a factor in this incident. It was noted that a check was made to insure that pins were lock-wired, but the position of the pins was not noted. Head lanterns, G6230-264-6449 are being provided for line personnel to facilitate working and holding on during adverse conditions in hours of darkness.

Surprise Inspections

RESULTS of surprise inspections of maintenance departments in units of the command were discussed. The inspections are more detailed and to a greater depth than before. The inspectors are finding some major discrepancies and many minor ones. In general, maintenance personnel were unaware of the value of technical publications and did not know how to use them. Many publications in shops were out of date. Electronics technicians did not know how to bench test equipment properly, certifying that equipment was operating at designed performance levels when such was not the case. It appears that personnel are being checked out verbally in maintenance procedures and never bother to verify the procedure by use of publications. Twelve discrepancies were found on one aircraft just out of major check.

The chairman discussed the latest Maintenance Error Study published by the Safety Center and pointed out that the recommendations of the study for administration of a maintenance department provided an excellent starting point—for any unit. These recommendations should be required reading for all maintenance officers and chief petty officers.—*NATechTraCom*

Loose Plug

A SPARK plug became unseated in an HUP-3 overwater flight causing a loss of power. As the pilot added throttle to maintain altitude, he experienced rough running and cutting out of the engine with further loss of power. By overspeeding and overboosting the engine and the use of prime, he succeeded in staying airborne until he covered about 5 miles to the carrier.

The initial loss of power due to unseating of the sparkplug was found to have been compounded by a carburetor malfunction which caused an excessively lean mixture as the pilot added throttle. The initial loss of the sparkplug was due to faulty installation.

Locating Leaks

THE problem of locating oil and fuel leaks after engine shutdown on high RPM test cell runs has been solved effectively at the USAF Power Plant Branch at Edwards Air Force Base, California.

Maintenance men spray a non-flammable, white, Zyglo developer (SP-9) from a 12-oz pressure can onto the probable leak sections of the engine. The spray dries on contact like chalk, absorbs moisture, and thus unmistakably identifies the leak area.

Because safety precautions do not permit inspection personnel to go into a test cell to observe engines running above idle speed, many high RPM leaks were not easily located before this method was adopted.

(Zyglo Developer, ZP-9, is manufactured by Magnaflux Corporation, 7300 West Lawrence Avenue, Chicago 31, Ill.)

FOD Prevention

IT COULD BE YOU

Time: 0430, 17 September 1942

Place: Guadalcanal, Solomon Islands

Facts: F4F Bureau Number 13018 returned from mission with fuel and push rod housing oil leaks at 2345, 16 Sept. '42. PFC F. IXIT, serial number 193967 was the assigned plane captain. PFC F. IXIT, while a good mechanic, had never heard of Quality Control and, as time was pressing and it was dark, he proceeded with repairs, gassing and oiling of the aircraft with vigor. Eager to please his pilot and show his ability in completing his work in time for the first flight, he stuffed his pockets with loose tools and proceeded to work. After completing work on the carburetor in the accessory section, he commenced to tighten push rod housing gland nuts that showed signs of oil leakage. Completing the job in time for his pilot, 1st-Lt Ufixim ILLFLYIT, to preflight and accept his aircraft, PFC F. IXIT stood by the fire bottle and, with a pride known to men who have completed an assigned task, watched his plane start up, taxi into position and takeoff with other aircraft as scheduled.

Result: Two hours later, the plane was in its revetment, having completed the assigned mission. Lt. ILLFLYIT had thanked PFC IXIT for a good job on getting the aircraft ready for flight and expressed confidence that the plane would be ready for the next mission. On the yellow sheet were the following notations, *"Had to wipe windshield with hand* to see on landing, *has little oil leak,* something loose and banging around in engine. Good plane, lots of power."

Findings: (1) loose ¾" box end wrench, (2) pair 6" diagonals and (3) one Ford wrench. (4) Two push rod housing gland nut packings squeezed out of gland nut. (Item (1), (2) and (3) found in accessory section.)

Note: On the next mission, PFC F. IXIT watched Lt. Ufixim ILLFLYIT, with much pride, takeoff on next mission *as scheduled.*

Time: Jet Age

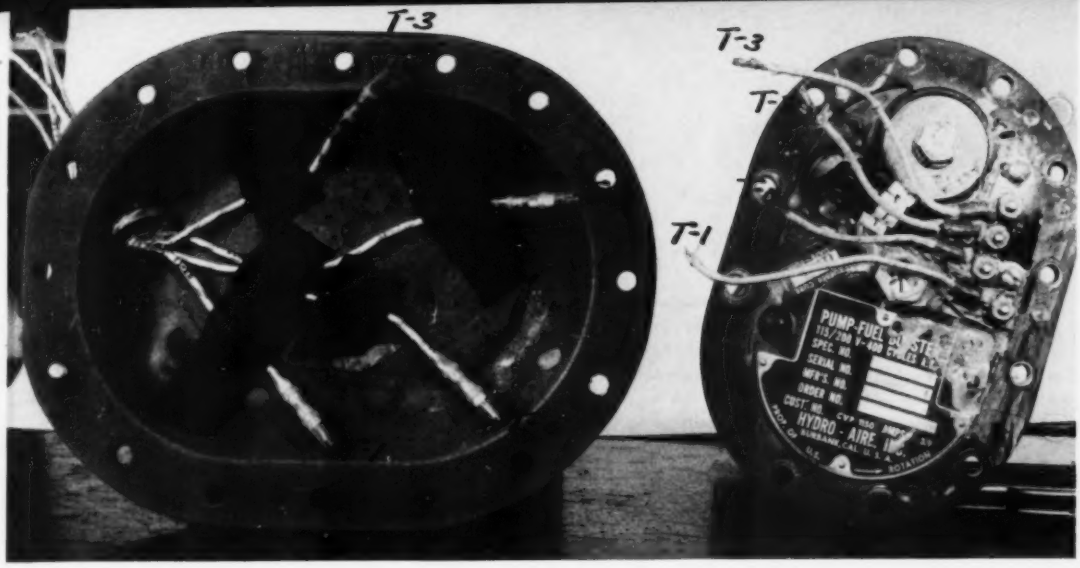
Place: MCAS Unameit

Situation: F9F preflighted, pilot inspected, and awaiting tower OK for takeoff. Permission granted, takeoff completed and wheels on way up. CATASTROPHE . . . engine failure and plane made uncontrolled collision with ground.

Facts: Plane received strike damage, pilot, LtCol Ufixim ILLFLYIT, received Alfa injury. After aircraft had come in from previous scramble and was being readied for a turn around, a small fuel leak was detected. PFC F. IXIT, Jr. had been assigned to correct the discrepancy. While PFC F. IXIT, Jr. was a good mechanic and fully acquainted with Quality Control, the immediate urgency of the situation interfered with his better judgment. So he proceeded to stuff his pockets with tools he might require. Upon completing the required work (tightening two loose nuts and lockwiring), he informed line chief MSgt F. IXIT, Sr. that work was completed; then, with concealed pride, watched the aircraft takeoff—!

"Cause of Engine Failure:" (1) small wrench had fallen out of pocket and had passed through compressor section.

Note: While this situation is not an actual case, the foregoing reemphasizes the fact: "Progress creates progressive changes and an increase of mechanical intricacies." To compensate for the advanced technology of today's aircraft, a program of Quality Control of *all phases* of maintenance must be established. The phraseology "Haste makes Waste," a basic truth from time immemorial, will become more predominant as maintenance procedures advance. — *1st [illegible]AW "Wingtips"* ●



Fuel Booster Pump and cover plate showing pump wires and aircraft wires (through coverplate) T-2 Aircraft wire (phase 2 power) was spliced to T-O Pump wire (ground lead). Aircraft T-O spliced to pump T-2.

MURPHY'S LAW*

AN F8U-1 was undergoing a major check (120-hour calendar system) and it had been necessary to replace the Forward Main Fuel Boost Pump. An explosion took place immediately upon first application of electrical power to the newly installed fuel boost pump, followed by an intense internal fire. *Causes:* Maintenance personnel reversed Phase 2 Power and Ground leads to fuel boost pump. Doubt exists as to bonding/grounding requirements, fuel cell area. *Comments and Recommendations of the Board:* The fuel boost pump was incorrectly wired in such a manner as to cause this accident and cannot be anything but what it is, *Human Error.* The established system of quality control is designed to minimize such errors.

Recommend (1) that the necessity for quality control be continually emphasized and the procedures be periodically reviewed, and revised as necessary. (2) That newly joined maintenance personnel be constantly supervised and briefed on squadron procedures until the smallest details are firmly in mind.

The procedures set forth in the HMI appear to be inadequate to safeguard against this type accident. One such example is that the requirement to install potting compound over the terminals of the fuel boost pump has existed since April 1958. Because these instructions have been impracticable, not only this unit but others as well, have conducted potting procedures in a manner contrary to the HMI.

There is doubt in the minds of the Board members, and in the minds of several technicians from whom the board had sought advice, as to the adequacy of the present electrical grounding within the F8U fuel cell. It appears that stray electricity from sources other than an improperly wired fuel pump might cause an arc in the cell.

It was recommended that the Manufacturer and/or BuWeps determine the adequacy of the present grounding within the F8U fuel cell.

Prompt action by maintenance personnel and by the station crash crew was directly responsible for limiting the damage and preventing possible injury to personnel. Complete destruction of the hangar and four aircraft might well have occurred had the fueled wing cells of the aircraft caught fire.

* If an airplane part can be installed incorrectly, someone will install it that way!

CLIPBOARD

Black Sheep

HERE is an idea that one station reports: "We have tried a new idea, with excellent results. We picked the individual who is most prone to bad safety habits and asked him to conduct our safety meeting. He chose his own subject and conducted the meeting himself. We have found that he not only learned a great deal but he is beginning to enjoy better safety habits already." — *National Safety Council "Safety Newsletter"*

Relaxed Alertness

IN A recent conversation, a pilot of one of the nation's leading airlines made a point for relaxed alertness in the cockpit. As he put it . . . "Whenever any sudden emergency arises in the cockpit, a fire warning, for example, the first thing that happens is that everybody gets into the act and forgets about the airplane. Ninety-nine times out of a hundred there is a period of time when the airplane is left to fly itself while everyone—pilot, copilot and engineer—is busy looking for the trouble. Especially at takeoff, 30 seconds can be enough to put a transport into the ground!"

According to the pilot, this sort of thing has happened time and again in simulator training flights . . . and might well have been a factor in a number of accidents which have occurred in actual operations. To eliminate this, he suggests the following.

1. Establish an absolute drill for emergencies under which the copilot instantly and automatically takes charge of the airplane, thus leaving the captain, who has the prime responsibility, to determine the extent of the emergency and the procedures to be followed to overcome it.

("This kind of drill should be S.O.P. in the simulator until the copilot reaction is completely automatic.")—*FSF, Inc.*

VORTAC

THE FAA has programmed 1100 VORTACs with DMET and 225 ILS with DMET to be complete by 1965. The FAA has two to three hundred VORTACs in operation.—*Flight Safety Foundation*

Answers to Quiz Page 15

1. Zero degrees centigrade.
2. Greater.
3. Yes. (Important exception: freezing rain.)
4. Yes, ice forms over the inlet guide vanes, causing a restriction in air flow, resulting in lowered thrust.
5. Return to the nearest airport and use power to land, keeping airspeed well above normal landing speed.
6. True. As airspeed is increased, the rate of deposit is increased.
7. Yes. Usually the zone extends about 4000 feet above the crests. In the case of unstable air, it may be higher.
8. Rime.
9. Alternate air.
10. Preheat.
11. Wing icing. It is, generally speaking, proportional to wing icing for a given icing condition.
12. Freezing rain. Avoid planning a flight through a freezing rain condition. If freezing rain is encountered climb to the warm air above if you can do so in a short time; if not, reverse course.
13. NO! Never take off with deicers on. They will act as spoilers and seriously disturb the air flow over the wing.
14. Drift. (Use rudder for directional control after landing, when rudder becomes ineffective use brakes sparingly.)
15. Lesser. At —40°C or below, you will not encounter any icing.

How Dependable Is A Radar Departure?

MANY crews have dropped their traffic watch to some extent after receiving a "radar departure," a promise of surveillance and notification of incidental VFR traffic which might be stooging around their neighborhood.

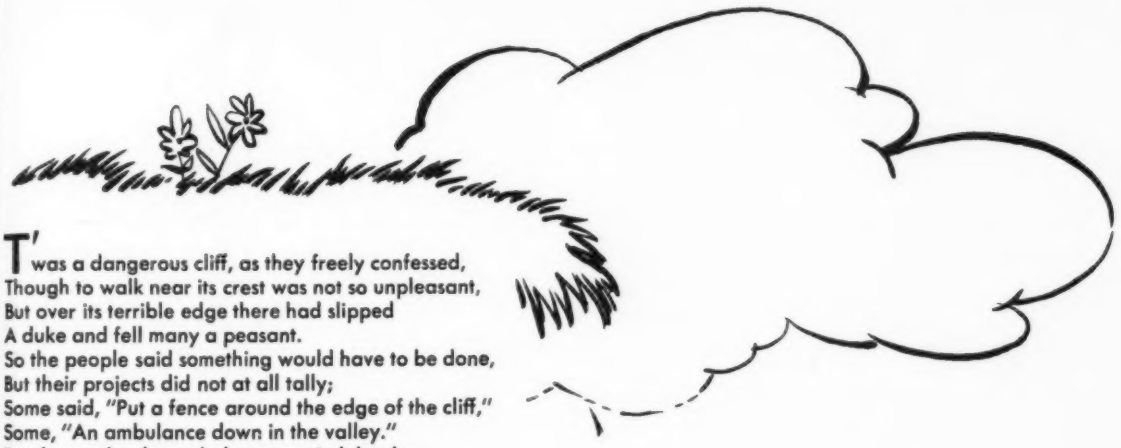
A recent incident occurred where an American Airlines flight questioned radar departure's validity following a near-miss with a small aircraft. We queried the FAA, and the following quote from the United States Manual of Radar Traffic Control Procedures is excerpted from their answer:

"1.4 Additional Services"

"Subject to the provisions of 1.4.4 of this manual, the controller will provide all aircraft operating on IFR flight plans with traffic information on all observed targets except when the pilot advises he does not wish the service.

"1.4.4—It should be noted that many factors (such as limitations of radar, volume of traffic, controller workload, and frequency congestion) may prevent the controller from providing the additional services provided under 1.4. The controller possesses complete discretion for determining whether he is able to provide or continue to provide, additional services in each individual case. His reasons for not providing or continuing to provide these services are not subject to question and need not be communicated to the aircraft."

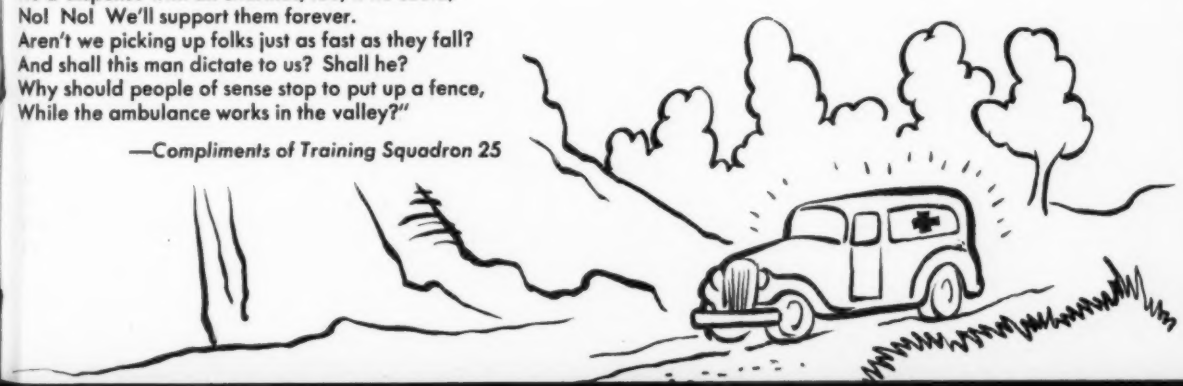
In a mixed IFR-VFR condition there's still only one consistent protection and that is the crew's own visual awareness of what's ahead.—*ALPA "Tech Talk"*



A FENCE OR AN AMBULANCE

T'was a dangerous cliff, as they freely confessed,
Though to walk near its crest was not so unpleasant,
But over its terrible edge there had slipped
A duke and fell many a peasant.
So the people said something would have to be done,
But their projects did not at all tally;
Some said, "Put a fence around the edge of the cliff,"
Some, "An ambulance down in the valley."
But the cry for the ambulance carried the day,
For it spread through the neighboring city;
A fence may be useful or not, it is true,
But each heart became brim-full of pity
For those who slipped over the dangerous cliff;
And the dwellers who lived in highway and valley,
Gave pounds and pence, not to put up a fence,
But an ambulance down in the valley.
"For the cliff is all right, if you're careful," they said,
"And, if folks even slip and are dropping,
It isn't the slipping that hurts them so much,
As the shock down below when they're stopping."
So day after day as these mishaps occurred
Quick forth would these rescuers rally,
To pick up the victims who fell off the cliff,
With their ambulance down in the valley.
Then an old sage remarked, "It's a marvel to me
That people give far more attention
For repairing results than to stopping the cause,
When they'd much better aim at prevention.
Let us stop at its source all this mischief," cried he,
"Come, neighbors and friends, let us rally;
If the cliff we will fence we might almost dispense
With the ambulance down in the valley."
"Oh he's a fanatic," the others rejoined,
"Dispense with the ambulance? Never!
He'd dispense with all charities, too, if he could;
No! No! We'll support them forever.
Aren't we picking up folks just as fast as they fall?
And shall this man dictate to us? Shall he?
Why should people of sense stop to put up a fence,
While the ambulance works in the valley?"

—Compliments of Training Squadron 25



Why SOP?

Analysis of the Aircraft Accident Reports for just the three months of January, February and March 1960 reveals that 23 of 162 accidents were associated with non-adherence to or non-existence of standing operating procedures! In these 23 accidents there were 10 fatal accidents with a total of 30 fatalities and 23 aircraft destroyed. The total dollar loss amounted to more than 17 millions.

This is a high price to pay just for the privilege of doing things differently!